



ACQUISITION INNOVATION  
RESEARCH CENTER

# ChatGPT Budget Justification Book Program Element Summarization: A Proof-of-Concept Demonstration

EXECUTIVE SUMMARY AND REPORT  
FEBRUARY 2024

## PRINCIPAL INVESTIGATOR

Philip S. Antón, *Stevens Institute of Technology*

## CO-PRINCIPAL INVESTIGATOR

Douglas J. Buettner, *Stevens Institute of Technology*

## ASSOCIATE PROFESSOR

Jose E. Ramirez-Marquez, *Stevens Institute of Technology*

## SPONSOR

**Commission on Planning, Programming, Budgeting, and Execution (PPBE) Reform**

(a legislative advisory committee established under Section 1004 of the National Defense Authorization Act (NDAA) for Fiscal Year 2022, Public Law 117-81, 12/27/2021)



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## RESEARCH TEAM

Name	Organization	Labor Category
Douglas J. Buettner	SERC/AIRC	Deputy Chief Scientist
Jose E. Ramirez-Marquez	Stevens Institute of Technology	Associate Professor
Philip S. Antón	SERC/AIRC	Chief Scientist

## ACKNOWLEDGEMENTS

We would like to thank the Commission on Planning, Programming, Budgeting, and Execution (PPBE) Reform for their sponsorship and support throughout this research. In particular, the discussions and inquiries by the Chairs and staff: HON. Robert Hale, the HON. Ellen Lord, as well as the commission staff, especially Lara Sayer (our sponsor of record), Annie Crum, Elizabeth Bieri, Caroline Bledsoe, Kelle McCluskey, Brooks Minnick, and Soleil Sykes. We would also like to thank David Cadman and Mark Krzysko of OUSD(A&S), for assistance in obtaining Level-1 earned-value data, and John Stedge in the Chief Digital and Artificial Intelligence Office (CDAO), for guiding us on how to pull the Obligations and Expenditures data from Advana. Thanks to Scott Lucero and Nathan Self from Virginia Tech for their support with extracting USASpending.com data from their data repository. Finally, we would like to acknowledge and thank our Stevens staff: Technical Editor, Nancy Méndez-Booth for her editorial review comments and suggestions, and Tara Kelly for her project management skills, edits, and overall support.

## ACRONYMS AND ABBREVIATIONS

<b>2D/3D</b>	2-Dimensional/3-Dimensional
<b>5G</b>	Fifth Generation
<b>A&amp;AS</b>	Advisory and Assistance Services
<b>ABADS</b>	Airbase Air Defense Systems
<b>ABMS</b>	Advanced Battle Management System
<b>ACAT</b>	Acquisition Category
<b>ACD&amp;P</b>	Advanced Component Development & Prototypes
<b>ADS</b>	Air Defense Sectors
<b>AEN</b>	Airborne Edge Node
<b>AI/ML</b>	Artificial Intelligence/Machine Learning
<b>API(s)</b>	Application Program Interface(s)
<b>ASE</b>	Architecture and Systems Engineering
<b>BA</b>	Budget Activity
<b>BMC2</b>	Battle management, command, and control
<b>C2</b>	Command and Control
<b>C3BM</b>	Command, Control, Communication and Battle Management
<b>C5ISR</b>	Command and Control, Communications, Computers, Cyber, Intelligence, Surveillance, Reconnaissance, Targeting
<b>CAO</b>	Chief Architect Office
<b>CBC2</b>	Cloud-Based Command and Control
<b>CDAO</b>	Chief Digital and Artificial Intelligence Office
<b>CDL EA</b>	Common Data Link Executive Agent
<b>CDS</b>	Cross Domain Solutions
<b>CFT</b>	Cross Functional Team
<b>CI/CD</b>	Continuous integration/continuous delivery
<b>CoA(s)</b>	Course(s) of Action
<b>COCOM(s)</b>	Combatant Command(s)
<b>CONUS</b>	Continental U.S.
<b>CR</b>	Capability Release
<b>DAF</b>	Department of the Air Force



<b>DBMN</b>	Distributable Battle Management Node
<b>DE</b>	Digital Engineering
<b>DI</b>	Digital Infrastructure
<b>DoD</b>	Department of Defense
<b>F-15E/EX</b>	F-15E Strike Eagle/Eagle II is the next-generation F-15E
<b>F2T2EA</b>	Find, fix, track, target, engage, and assess
<b>FFRDC</b>	Federally Funded Research and Development Corporation
<b>FY</b>	Fiscal Year
<b>ID/IQ</b>	Indefinite Delivery/Indefinite Quantity
<b>IR</b>	Information Repository
<b>JADC2</b>	Joint All Domain Command and Control
<b>J-Books</b>	Justification Books
<b>JCM</b>	Joint Communications Marketplace
<b>JCO</b>	Joint Concept of Operations
<b>JTNC</b>	Joint Tactical Networking Center
<b>KC-46/KC-46A</b>	USAF "Pegasus" Multirole Air Refueling Tanker
<b>LLM(s)</b>	Large Language Model(s)
<b>LOE</b>	Level of Effort
<b>MAJCOM(s)</b>	Major Commands
<b>MA-MLS</b>	Multiple-Award, Multi-Level Security
<b>MDA</b>	Mission Domain Architectures
<b>MITs</b>	Mission Integration Team
<b>MVCR</b>	Minimum Viable Capability Release
<b>MVP</b>	Minimum Viable Product
<b>N&amp;NC</b>	NORAD and USNORTHCOM
<b>NATO</b>	North Atlantic Treaty Organization
<b>NDAA</b>	National Defense Authorization Act
<b>NLP</b>	Natural Language Processing
<b>NORAD</b>	North American Aerospace Defense Command
<b>OCO</b>	Overseas Contingency Operations
<b>OCONUS</b>	Outside the Continental U.S.
<b>OCR</b>	Optical Character Recognition



<b>OCS</b>	Open Communications Standards
<b>OGC</b>	Other Government Costs
<b>ORT</b>	Operational Response Team
<b>PADS</b>	Pacific Air Defense Sector
<b>PB</b>	President's Budget
<b>PDF</b>	Portable Document Format
<b>PE</b>	Program Element
<b>PEO</b>	Program Executive Officer
<b>PPBE</b>	Planning, Programming, Budgeting, and Execution
<b>RCO</b>	Rapid Capabilities Office
<b>RDT&amp;E</b>	Research, Development, Test & Evaluation
<b>S&amp;T</b>	Science & Technology
<b>SAE</b>	Service Acquisition Executive
<b>SAP</b>	Special Access Program
<b>SAR(s)</b>	Selected Acquisition Report(s)
<b>SBIR</b>	Small Business Innovation Research
<b>SCM</b>	Security Cryptographic Module
<b>SD-WAN</b>	Software Defined Wide Area Networking
<b>SecAF</b>	Secretary of the Air Force
<b>STTR</b>	Small Business Technology Transfer
<b>SW</b>	Software
<b>TDNE</b>	Tactical Data Network Enterprise
<b>TOC</b>	Tactical Operations Centers
<b>TOC FoS</b>	TOC Family of Systems
<b>TS/SCI</b>	Top Secret/Sensitive Compartmented Information
<b>UI/UX</b>	User Interface/User Experience
<b>US/U.S.</b>	United States
<b>USAF</b>	U.S. Air Force
<b>USG</b>	U.S. Government
<b>USNORTHCOM</b>	U.S. Northern Command
<b>USSF</b>	U.S. Space Force
<b>WOC</b>	Wing Operations Centers

## ABSTRACT

When the yearly President's Budget (PB) is submitted to Congress for authorization and appropriations, the Department of Defense (DoD) Comptroller submits several Budget Documents, also called "Justification Books" or "J-Books." These are detailed documents that justify the budgetary requests for specific programs, projects, or activities within the DoD. These documents, currently provided only in PDF format, are individually submitted by each of the military services and the various agencies. Each service and agency submitting their own requests results in disjointed information that can be hard to read.

Further, the Section 809 panel<sup>1</sup> recommendations include that the DoD implement a portfolio-based capability framework (see Section 809 Panel link in the references under the Volume 3 tab, Recommendations 36-39). This recommendation and our intent to make these documents easier to read for all personnel drives the following research question: *Can the existing J-Books be restructured to facilitate a portfolio view and allow the utilization of Artificial Intelligence/Machine Learning (AI/ML) techniques including Large Language Models (LLMs) or "Generative AI"<sup>2</sup> to answer questions about DoD spending without changing the existing layout and document delivery approach?*

This is the second of two reports to address our results from the investigation of two initial exploratory research approaches. It is an initial proof-of-concept approach that uses a key word search across multiple J-Books to extract the content associated with the key word. For the purposes of this proof-of-concept demonstration, we chose to simply extract the sentences associated with the key word "JADC2" (Joint All Domain Command and Control).<sup>3</sup> JADC2 was chosen as this DoD strategy spans multiple service's Research, Development, Test & Evaluation (RDT&E) J-Book volumes. Subsequent (2nd and 3rd tier) associated acronyms were then extracted using a ChatGPT query of the initial results.

The research documented in this report was intended to determine if ChatGPT could support analysis of the large volume of budget materials found in the DoD Comptroller's J-Books documents in support of our larger proof-of-concept to reorganize these documents into a portfolio. We found that, while continuously improving, LLMs such as ChatGPT were not up to the challenge of analyzing the large volume of information we have in our budgetary materials. Overall, however, we were able to integrate the ChatGPT LLM into our prototype implementation and successfully used it to analyze smaller samples of data. Thus, we feel our results from this initial research are promising and adequately demonstrate the merit of the approach.

Additional strategies for future research include semantic network analysis, trend analysis, resource allocation modeling, temporal modeling, and operational implications assessment, and offering a holistic approach to dissecting and comprehending a program's dynamics. These methods can provide deep insight into inter-service synergy, technological integration, resource allocation, and operational implications.

Ultimately, this research empowers the DoD and Congress to an alternative approach to understand the complexities and interdependencies of these programs, how they can begin to associate programs into portfolios, and contribute to a more comprehensive understanding. Such insights enhance the capabilities and effectiveness of military programs and inform more efficient resource allocation, bolstering the overall decision-making processes. This research can significantly influence program development and implementation, ultimately advancing national defense and military strategies.

<sup>1</sup> For information about the Section 809 Panel statute and what it was empowered to do, see *FY 2016 National Defense Authorization Act (Public Law 114-92)*. The link is provided in the reference section at the end of this report.

<sup>2</sup> We use LLM or LLMs as the general "generative AI" term in this report.

<sup>3</sup> For information about JADC2, download and read the DoD's *SUMMARY OF THE JOINT ALL-DOMAIN COMMAND & CONTROL (JADC2) STRATEGY* document. The link is provided in the reference section at the end of this report.



We believe a follow-on effort should attempt to characterize the various ChatGPT PDF reader plugins, updates to ChatGPT-4, and other LLMs to determine if they can be trained/tuned to provide summarizations that directly align with congressional staff needs. Further, using a specifically trained LLM from the Chief Digital and Artificial Intelligence Office (CDAO) could also be a future research step.

The team recommends the following for future research:

- **Fund further research into LLM support of Budgetary Analysis:** Noting that Advana<sup>4</sup> has implemented the “GAMECHANGER”<sup>5</sup> capability, and a blog indicates that at least one tool vendor may have resolved the issues noted in this report<sup>6</sup>, further research should assess various LLMs and confirm that an LLM can be trained on the DoD’s corpus of data. The goal is to confirm that a ChatGPT text-based query interface can reliably support and enhance analysts with their tasks.
- **Fund further efforts to reorganize budget documents:** Providing portfolio-like budget views from AI/ML reorganizations without having to make drastic changes to the existing documentation format used by the various services would simply add a processing step to the existing delivery flow. Once completed, these results can support collaborative decisions on what changes and additions should be promulgated to the services to fully enact a portfolio management approach that includes a portfolio budget view during the accumulation of the data.

<sup>4</sup> Advana is the Department of Defense’s (DoD’s) enterprise-wide, multi-domain data, analytics, and artificial intelligence (AI) platform that provides military and civilian decision makers, analysts, and builders with unprecedented access to enterprise tools and capabilities—all in a scalable, reliable, and secure environment.

<sup>5</sup> For additional information on GAMECHANGER, see for example, <https://www.dia.mil/News-Features/Articles/Article-View/Article/2926343/gamechanger-where-policy-meets-ai/>

<sup>6</sup> A blog (<https://c3.ai/c3-generative-ai-getting-the-most-out-of-enterprise-data/>) from Graham Neubig, Associate Professor of Computer Science, Carnegie Mellon University, indicates that many of the issues identified here have been resolved by at least one LLM vendor.

## JUSTIFICATION BOOKS (J-BOOKS) CONTENT ASSOCIATION AND SUMMARIZATION

### BACKGROUND

The Department of Defense (DoD) Budget Documents, also called “Justification Books” or “J-Books” are detailed documents that justify their budgetary requests and resource allocation for specific programs, projects, or activities within the DoD. These documents are typically produced as part of the President’s Budget (PB) request to Congress in the U.S. federal budgeting process and serve several essential purposes, such as:

**Resource Justification:** J-Books provide a comprehensive rationale for allocating resources, including funds, personnel, and equipment, for specific defense-related activities. This justification is essential for decision-makers in Congress who assess and approve the DoD budget.

**Transparency:** J-Books are designed to enhance transparency in the budgeting process. They help the public, Congress, and other stakeholders understand the DoD’s financial needs, the objectives of various programs, and how to utilize resources.

**Accountability:** They hold the DoD accountable for how it spends taxpayer dollars. By detailing each program’s expected outcomes and benefits, J-Books allows Congress to assess whether the proposed expenditures align with national defense priorities.

**Program Evaluation:** These documents with other associated materials (e.g., National Defense Authorization Acts (NDAA), Selective Acquisition Reports (SARs)) help evaluate the performance and effectiveness of DoD programs. They often include metrics and performance measures, allowing Congress to gauge the success of these programs.

**Program Planning:** J-Books assist in program planning by outlining goals, objectives, and expected milestones for various DoD initiatives. This information is critical for managing and tracking the progress of these programs.

**Congressional Approval:** J-Books play a crucial role in the congressional approval process. They are used by Congress to make informed decisions regarding the allocation of defense funds and to ensure that the DoD budget aligns with national defense and security priorities.

### PROBLEM STATEMENT

A comprehensive understanding of the complexities and interdependencies of DoD programs, viewed through J-Books, ultimately advances national defense capabilities, and helps in formulating sound budgetary strategies. However, understanding the budgetary implications of various DoD acquisition programs through J-Books is daunting, especially for complex cross-domain strategies like Joint All Domain Command and Control (JADC2). JADC2, which is woven throughout the different branches of the DoD, is challenging. Tools present within the DoD’s Advana<sup>7</sup> environment (e.g., GAMECHANGER<sup>8</sup>), and potentially specialized tools built external to the DoD can support human-based analysis.

<sup>7</sup> Advana is the Department of Defense’s (DoD’s) enterprise-wide, multi-domain data, analytics, and artificial intelligence (AI) platform that provides military and civilian decision makers, analysts, and builders with unprecedented access to enterprise tools and capabilities—all in a scalable, reliable, and secure environment.

<sup>8</sup> For additional information on GAMECHANGER, see for example, <https://www.dia.mil/News-Features/Articles/Article-View/Article/2926343/gamechanger-where-policy-meets-ai/>

We provide a conceptual Portfolio Analysis Dashboard using Tactical Aircraft below in Figure 1.<sup>9</sup>



**Figure 1: Conceptual Portfolio Analysis Dashboard using Notional Tactical Aircraft (TacAir)**

The primary analyst workstation would allow menu access to various portfolios managed by the Department of Defense (top dual monitor layout in Figure 1 with notional analytical charts and graphs). The arrow depicts a conceptual roller-wheel mouse interface to allow the analyst to select among the various aircraft managed for click-through deep-dives. An alternative concept is the overall TacAir chart on the bottom-left ranking the aircraft by funding in the rows and the Fiscal Year (FY) in the columns with a rolled-up portfolio funding view at the bottom.

<sup>9</sup> Note that OpenAI's ChatGPT and DALL-E terms of service can be found here, <https://openai.com/policies/terms-of-use>, with their publication policy found here, <https://openai.com/policies/sharing-publication-policy>. Stock language provided by OpenAI is amended to the following: *The authors generated this content in part with GPT-3.5 and GPT-4, OpenAI's large-scale language-generation model. Upon generating draft language and DALL-E concept art, the authors reviewed, edited, and revised the language to their own liking and take ultimate responsibility for the content of this publication.*

The following list describes additional monitor-specific analytical concepts:

#### **Left Monitor:**

##### **1. Newly Proposed Spending Analysis:**

- **Visual Representation:** Charts and graphs displaying the newly proposed spending.
- **Details:** Data shows service system contributions, e.g., Air Force, Army, Navy, and Space Force.
- **Interactivity:** Users can hover over sections of the charts to view exact figures and percentages.

##### **2. Lines of Effort Details:**

- **Drill-Down Section:** Interactive selection that allows users to explore various lines of effort.
- **Information Display:** Provides project names, services involved, and allocated budgets.
- **User Interaction:** (L/R) clicking on a graph reveals additional information and historical data.

##### **3. Large Language Model (LLM) Interface:**

- **Summarization:** An LLM interface support for requesting a quick summarization of the observed trends.
- **New Queries:** Interface to the back-end database to create normal language data queries to populate selected charts and figures.

#### **Right Monitor:**

##### **1. Past Budget Submissions:**

- **Tabular Format:** Information on past budget submissions allowing FY-after-FY comparisons.
- **Graphical Data:** Line graph with trends in budget submissions over time.
- **Accessibility:** Users can sort and filter this data based on different parameters.

##### **2. Latest (Real-Time/Monthly/Weekly) Cost/Schedule Performance Data:**

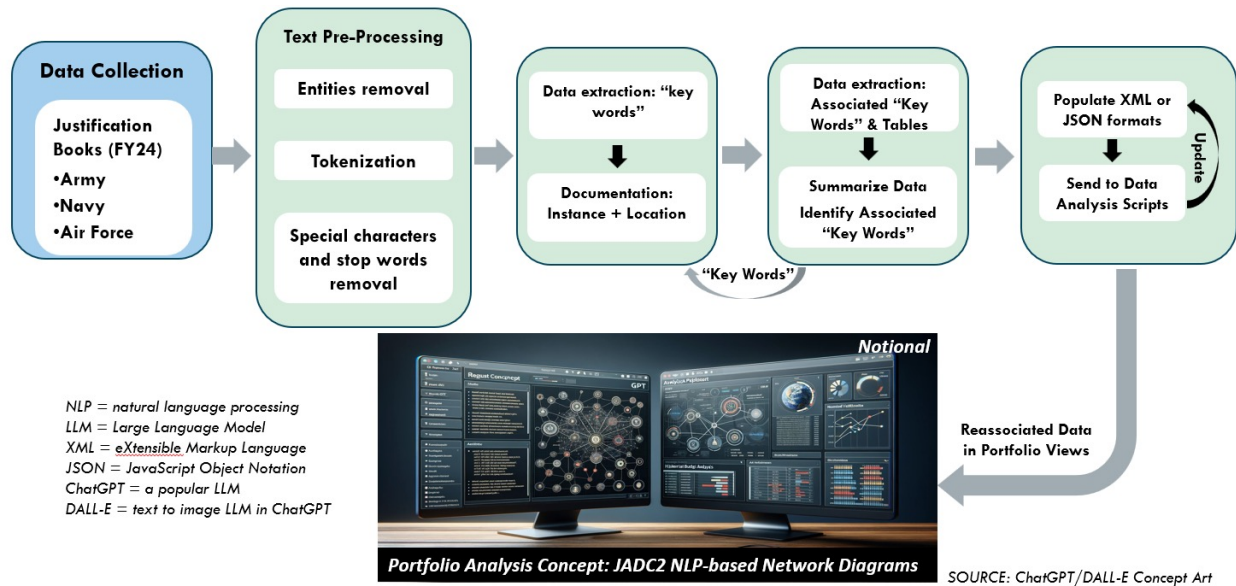
- **Visual Indicators:** Latest data from the EVMS, cost, schedule, and performance risks.
- **Color-Coded Alerts:** Risks are indicated using color-coded alerts, providing an immediate sense of any issues. (Further drill-down with the latest SPO risk management updates for details.)
- **Detailed Metrics:** Information on cost overruns, schedule delays, and other metrics.

##### **3. User Interface and Navigation:**

- **Navigation Panel:** Monitors feature intuitive navigation panels for easy access to different sections.
- **Customization:** Users can customize the views and prioritize the information they find relevant.

## APPROACH

Figure 2 shows the overall proof-of-concept flow for our proposed approach. We will discuss in this section the approach taken to implement this analysis flow.



**Figure 2: Proof-of-Concept Portfolio Analysis Flow using JADC2 Keyword Search of FY24 J-Books**

Our proposed approach provides an initial proof-of-concept for accumulating programs into “portfolio-like” groupings, leading to a clearer representation of budgetary implications across DoD programs. It is important to note that the information accumulated using this NLP approach on J-Books does not result in a true portfolio (as there is information that will be lacking) but is a step towards restructuring the existing content as elements in a portfolio.<sup>10</sup> For this reason, the approach using JADC2 demonstrates a “portfolio-like” representation of these budget materials.

Hence, we believe it will help in the following areas:

**Inter-Service Synergy:** What are the fundamental mechanisms or strategies to enhance synergy and coordination among the Army, Navy, and Air Force regarding related programs to maximize their effectiveness and interoperability?

**Technological Integration:** Technology integration should be considered a core component of J-Books analysis. It would clarify how emerging technologies are incorporated into different programs and how they intersect across the various branches.

**Resource Allocation:** How do allocating resources and budgetary decisions within each branch affect the development and implementation of related programs? What are the trade-offs and challenges associated with resource allocation? How have resource allocation and budget requests changed over time? Can we correlate these temporal fluctuations with risk management behaviors of DoD decision makers?

<sup>10</sup> A true portfolio would include numerous other elements that are not present in the publicly available J-Books, such as resource allocation, strategic value, risk assessments, and mitigation costs, among others.

**Operational Implications:** Within the J-Books framework, it's essential to understand the functional implications of programs like JADC2 on the specific missions and functions of the Army, Navy, and Air Force. Moreover, it delves into how these branches adapt to accommodate changes to ensure the success of their missions.

This project aims to eventually leverage the promise of Natural Language Processing (NLP) techniques to accumulate data associated with programs (or instances) and strategies within J-Books. Moreover, by harnessing the power of NLP and generative artificial intelligence (AI), the project aims to enhance the understanding of budgetary implications across J-Books.

The overall objectives of this project are described in two phases:

**Phase 1. Demonstrate NLP J-Books “portfolio-like” accumulation:** After identifying J-Book sections associated with keywords (acronyms) through NLP pattern matching, we plan to associate other materials (e.g., NDAAAs, SARs, etc.), thus demonstrating “portfolio-like” budgets and displaying their context in a network diagram.<sup>11</sup>

**Phase 2. Add analytics:** The project will then prototype an analytical front-end of the information for algorithmic approaches to facilitate a deep understanding of the portfolio's trends. The prototype includes an OpenAI Large Language Model (LLM) front-end to provide responses to chat-like questions regarding the data and text, with visual displays.

## METHOD USED TO DEMONSTRATE J-BOOKS SUMMARIZATION BY AN LLM

The efficient processing of large volumes of text-based documents presents a significant contemporary challenge in information management. This section identifies the steps used to test out a LLM (ChatGPT-4)<sup>12</sup> on the content within a J-Book's document. A discussion on our framework was provided under a separate report titled, *Proof-of-Concept Demonstration: J-Book Key Word Search Association*.

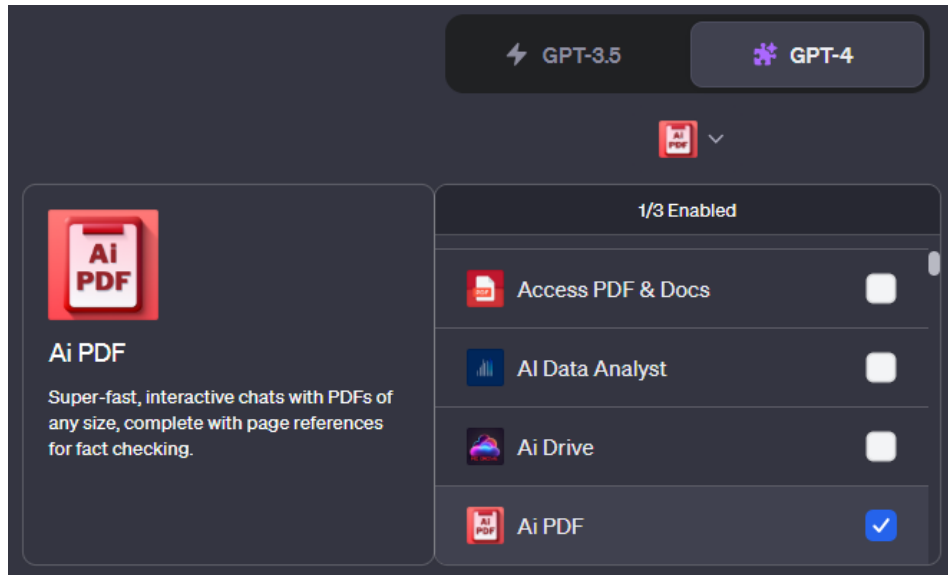
The proof-of-concept described here is a risk reduction to demonstrate the integration of an LLM into Phase 2 where the focus would be on analytics extraction, exploitation, and portfolio reorganization. Hence, our aim is to demonstrate just some of the promise of LLMs to efficiently summarize large volumes of text.

Figure 3 provides a screengrab of the ChatGPT-4 interface selecting the “Ai PDF” plugin, which was used for this demonstration.

<sup>11</sup> Network diagrams are used as a graphical depiction of the data. See for example Crane, Hevey, and Widom for some of the benefits from this kind of analysis.

<sup>12</sup> ChatGPT-4 is one of the popular Large Language Models (LLMs) that is available from OpenAI. The "OpenAI" name, the OpenAI logo, the "ChatGPT" and "GPT" brands, and other OpenAI trademarks, are property of OpenAI. The contents of this research were written with ChatGPT version 4 as described. OpenAI's terms and policies can be found here: <https://openai.com/policies>, with terms of use found here: <https://openai.com/policies/terms-of-use>.





**Figure 3: Screenshot of the ChatGPT-4 Plugin “Ai PDF”**

It is worth noting that we tried several different PDF chat plugins, however, they typically provided limited capabilities without paying for their more capable versions. Hence, for the purposes of this demonstration, we chose the “Ai PDF” plugin as it satisfied our demonstration requirements. This plugin requires that the PDF documents be uploaded to an online “drive,” <https://myaidrive.com>, for it to access documents that are not publicly available through a web link.

To start off, we attempted to interact with a number of those PDF chat plugins, trying to extract information on where JADC2 was contained in them. None of the free versions were up to the task due to the previously discussed limitations. However, it is entirely possible that a paid-for plugin may be up to the full document analysis and summary task. Appendix A shows our attempt to get this ChatGPT plugin to analyze the document for the JADC2 key word in the larger document, and Appendix B documents the repeatability of the analysis through repeating the exact same questions four more times a few days after our first attempt to analyze just a subsection of a J-Book.

For the purposes of this demonstration and to give the LLM plugin a smaller, more manageable document to analyze, we chose to manually extract a section from one of the J-Books documents that included the keyword “JADC2” (Joint All Domain Command and Control). JADC2 was chosen as this DoD strategy spans multiple service’s Research, Development, Test & Evaluation (RDT&E) J-Book volumes. The program element (PE) selected was PE 0604003F for the Air Force’s Advanced Battle Management System (ABMS) program. Screenshots of the 19 pages summarized by the plugin are provided in Appendix B.

## RESULTS

This section contains the questions and results from using the “Ai PDF” plugin to specifically analyze a section of a U.S. Air Force (USAF) J-Book with JADC2 in it. This copy-and-paste from the ChatGPT-4 session are augmented below to show what was viewed as we proceeded through the demonstration. For example, the ChatGPT logo and the “Used Ai PDF” text box are included below, instead of just having the text “ChatGPT” or “Used Ai PDF.” In addition, the actual link to the AF extracted PDF document was replaced with “REDACTED” in the below request.

DB

I'm going to provide you with a link to a PDF document on myadrive. Provide a summary of the information provided in this document: REDACTED/FY24-AF-RDTE.pdf FY 24 Vol II extract of PE 0604003F / Advanced Battle Management System (ABMS)



Used Ai PDF

The document you provided is an extensive report from March 2023, detailing the budget item justification for the U.S. Air Force's Advanced Battle Management System (ABMS) for the fiscal year 2024. Here's a summary of the key points:

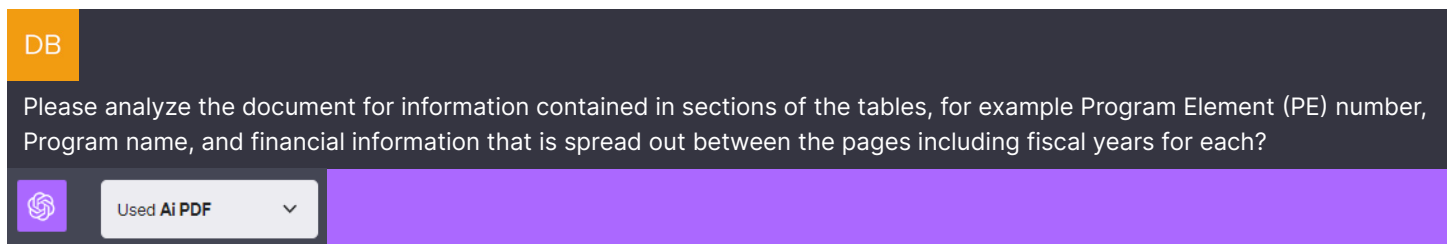
- 1. Overview and Financials:** The report begins with a financial overview, highlighting a significant budget allocated for the ABMS, underlining its importance. The total cost for the program element is continuing, with specific figures listed for years 2022 to 2028. The budget shows a substantial increase in funds for 2024, emphasizing the program's expansion.
- 2. Mission Description:** ABMS is crucial for the Department of the Air Force, contributing significantly to the Joint All-Domain Command and Control (JADC2) warfighting concept. It aims to integrate individual military activities across all domains, enhancing effectiveness and compensating for vulnerabilities. The program connects sensors, command and control systems, and weapons across the U.S. Space Force (USSF) and U.S. Air Force (USAF), delivering infrastructure and secure data for global battle management.
- 3. Organizational Changes and Integration:** In November 2020, the DAF Rapid Capabilities Office became the ABMS Integrating Program Executive Office (PEO), marking a transition towards enduring ABMS capabilities. In September 2022, a new structure emerged, combining previous efforts and focusing on system-of-systems engineering and technical discipline across the enterprise. This reorganization aimed to enhance ABMS's effectiveness in supporting DAF operations.
- 4. Core Programs and Investment Strategies:** The DAF PEO C3BM identified 50 programs as the core elements of the DAF BATTLE NETWORK, working in partnership with other PEOs to ensure integration and operational decision advantage. Investments align with USSF investments, optimizing capability delivery and eliminating duplication of effort. The ABMS investment strategies are categorized into four thrust areas focusing on architecture, digital infrastructure, software/applications, and aerial networking.
- 5. Components and Capabilities:** The ABMS is not just a weapon system or sensor; it's an aggregate of material and non-material solutions integrating a data network that connects and empowers current and future weapon system platforms and sensors. It involves secure processing, connectivity, data management, applications, sensor integration, and effects integration. The ABMS Battle Lab will provide a digital experimentation environment to explore new technologies and develop tactics, techniques, and procedures.
- 6. Thrust Areas:** The document details activities and initiatives under each of the four thrust areas for fiscal year 2024. These include digital engineering, mission domain architectures, cloud-based command and control, distributed battle management applications, and the Airborne Edge Node program. Each area supports the six ABMS elements, ensuring a focused delivery of investments to enable the broader DAF BATTLE NETWORK.



**7. Future Projections and Uses:** The report emphasizes the ongoing work and future plans for each component of the ABMS, highlighting the importance of integration, modernization, and investment in new technologies. The program is positioned as essential for maintaining national security and military advantage.

The document concludes with administrative and financial details, emphasizing the program’s complexity and the multifaceted approach required for its successful implementation. The detailed financial breakdowns, organizational strategies, and projected outcomes underline the U.S. military’s commitment to innovation and integrated defense strategies.

*Note: This summary covers the information provided in the document up to the point where the text was cut off.*



The document you provided contains detailed tables spread across multiple pages, outlining various aspects of the Advanced Battle Management System (ABMS) program. Here’s a breakdown of the information based on the sections you’re interested in:

**1. Program Element (PE) Number and Name:**

- PE Number: 0604003F
- Program Name: Advanced Battle Management System (ABMS)

This identifier is crucial as it uniquely identifies the ABMS within the Department of Defense’s budget documentation for research, development, test, and evaluation (RDT&E) programs.

**2. Financial Information:** The financial data is spread across several fiscal years, showing the program’s funding history and future projections. Here’s a summary:

- **Prior Years:** No specific figures provided, indicating that the program might have been initiated recently before the current budget period.
- **FY 2022:** \$262.452 million was allocated.
- **FY 2023:** \$237.332 million was allocated.
- **FY 2024:**
  - » Base: \$500.575 million
- **OCO (Overseas Contingency Operations):** \$0.000 (indicating no funds were allocated for contingency operations)
- **Total:** \$500.575 million (This significant increase suggests an expansion or acceleration in program activities.)
- **Future Years:**
  - » FY 2025: \$815.046 million
  - » FY 2026: \$951.369 million
  - » FY 2027: \$721.619 million
  - » FY 2028: \$711.021 million (marked as “Continuing,” suggesting ongoing funding beyond this period)

These figures represent the total cost of the ABMS program element, covering all its projects and activities. The funding supports various aspects, including research, development, testing, evaluation, and potentially the procurement of new technologies or capabilities.

### 3. Program Details:

- The ABMS is described as the primary program element funding architecture, digital infrastructure, and software development for the Department of the Air Force's contribution to the Joint All-Domain Command and Control (JADC2) warfighting concept.
- It's a comprehensive system aiming to integrate sensors, command and control systems, and weapons across the U.S. Space Force (USSF) and U.S. Air Force (USAF). The goal is to enhance global battle management, situational awareness, and decision-making capabilities.

**4. Quantity of RDT&E Articles:** This section doesn't contain specific figures in the pages provided. It's common in budget documents for certain procurement or RDT&E details to be summarized without quantities, especially if they involve sensitive technologies or are classified.

The document underscores the strategic importance of the ABMS for national defense, reflecting substantial investments to ensure the U.S. maintains technological and operational superiority. The detailed financial breakdowns highlight the government's commitment to funding innovative defense solutions, with increasing investments projected for the coming years.



Yes, for the analysis of the PDF document you provided, I solely utilized the AI PDF plugin. This tool allows me to directly access and interpret the content of PDF files. The information and summaries provided were based on the extracted text from the PDF document, specifically focusing on the content as it pertains to the Advanced Battle Management System (ABMS) and the associated financial and programmatic details.

If there are more specific analyses or deeper context required beyond the content of the PDF, I would typically use general knowledge, historical data, and contextual understanding to provide a comprehensive response. However, in this case, the analysis was entirely based on the direct content from the PDF, without external augmentation or referencing.

DB

In the financial information analysis above, please split this out to provide page location this information came from and if you did anything to it besides reporting it. For example, did you sum the data up to provide the fiscal year information?



Used Ai PDF

Certainly, I understand the importance of clarity in data handling. Here's a detailed breakdown of how the financial information was extracted from the document, including the specific locations and any additional processing applied:

### 1. Page 1:

- Program Element (PE) Number and Name:
  - » PE Number: 0604003F
  - » Program Name: Advanced Battle Management System (ABMS)
- **Financial Information** (No calculations were made; the data was reported as presented in the document):
  - » Prior Years: Not specified in the document.
  - » FY 2022: \$262.452 million
  - » FY 2023: \$237.332 million
  - » FY 2024:
    - » Base: \$500.575 million
    - » OCO (Overseas Contingency Operations): \$0.000
    - » Total for FY 2024: \$500.575 million

This page provides an overview of the program and its financial allocations for specific fiscal years. The data was directly reported without any summation or calculation on my part.

### 2. Future Projections (These were not tied to specific page numbers in the initial extraction, but they follow sequentially, indicating they are likely on the subsequent page or section):

- FY 2025: \$815.046 million
- FY 2026: \$951.369 million
- FY 2027: \$721.619 million
- FY 2028: \$711.021 million (Continuing)

For these future projections, the information was also reported as presented in the document without any additional calculations. The "Continuing" notation for FY 2028 suggests ongoing funding beyond this period, as detailed in the budget item justification.

### Additional Context:

- The financial data for each fiscal year was presented as a total figure for that year within the program element for ABMS. There was no need for summation or aggregation of data points since each fiscal year's allocation was provided as a single figure.
- The figures represent comprehensive funding for all projects and activities under the ABMS program element, including but not limited to research, development, testing, evaluation, and potential procurement.

- No data manipulation, such as summation or averaging, was performed on the financial figures. They were extracted directly from the text as whole values attributed to their respective fiscal years.

This approach ensures the fidelity of the financial data as it reflects the exact figures documented for congressional justification and public record, maintaining the integrity of the budgetary information.



The financial details for each fiscal year mentioned in the document are spread across multiple pages and sections. Here's a breakdown based on the extracted information:

**1. Page 17:**

- **FY 2022:** \$262.452 million
- **FY 2023:** \$237.332 million
- **FY 2024:**
  - Base: \$500.575 million
  - OCO: \$0.000
  - Total for FY 2024: \$500.575 million (Continuing)

This page provides an overview of the program and its financial allocations for specific fiscal years. The data was reported as presented in the document, with no additional calculations made.

**2. Page 16-17:**

- Details of the financial breakdown for FY 2024 are provided, including various contracts and their respective costs. Specific figures for different aspects of the program are mentioned, such as testing and evaluation, management services, and others.

**3. Page 5:**

- A change summary explanation is provided, detailing adjustments between fiscal years. For instance, FY 2022 saw a reduction of \$6.397 million due to transfers, while FY 2023 received a \$10.000 million Congressional add. FY 2024 reflects a decrease of \$55.533 million from the previous President's Budget, with explanations provided for these financial adjustments.

**4. Pages 3, 4, 5, 6:**

- These sections discuss the program's components, including Architecture and Systems Engineering (ASE), with specific financial allocations for FY 2024 (e.g., ASE receiving \$80.000 million). The narrative explains the program changes and the rationale behind financial allocations.

**5. Page 13, 14:**

- Further explanations of the program's components and their activities are provided, with consistent work remaining from FY 2023 to FY 2024 for certain projects.

## 6. Page 16:

- Detailed breakdowns of product development costs are provided, including specific projects within the Advanced Battle Management System (ABMS) and their respective funding for FY 2024.

The financial data for each fiscal year was presented as total figures for that year within the program element for ABMS. The figures represent comprehensive funding for all projects and activities under the ABMS program element. The information was extracted directly from the text as whole values attributed to their respective fiscal years, without any summation or aggregation of data points. The detailed breakdowns provide insight into how funds are allocated across different components of the program.

## PHASE 2 ANALYTICS - RECOMMENDED FUTURE WORK

Phase 2 of the framework is intended to provide a versatile toolkit for developing analytics, data, text, and visuals. These processes contribute significantly to information organization, retrieval, and insight generation. To address the questions specified in the problem statement, this research would address the following:

**Full-Context Extraction and Portfolio Reformating:** Expand this proof-of-concept text extraction script to leverage these well-formatted J-Books to extract other important contextual information, such as cost data. We would then demonstrate restricting the data into representative portfolios.

**Inter-Service Synergy:** Implement semantic network analysis to identify critical nodes and their relationships.<sup>13</sup> Analyze links between these nodes based on their proximity within the text.

Apply community detection algorithms like the Louvain or Leiden algorithms<sup>14</sup> to identify clusters of related content. This approach can reveal the synergy and coordination among the Army, Navy, and Air Force regarding associated programs. Figure 4 illustrates this type of analysis for a project to identify skills within the acquisition community.

**Technological Integration:** Analyze text data to identify trends (trend analysis) and patterns in technological integration within the Army, Navy, and Air Force programs through time and programs. Investigate the adoption of emerging technologies across different programs and how these technologies intersect across various branches.

**Resource Allocation:** Develop models to simulate and analyze resource allocation scenarios within each branch and assess their impact on program development and implementation. Investigate the trade-offs and challenges of different resource allocation strategies.

**Operational Implications:** Analyze the text data to understand the operational implications of programs like JADC2 on the specific missions and functions of the Army, Navy, and Air Force.

Investigate how these branches adapt to accommodate changes and ensure the success of their missions.

**Temporal Association and Differencing:** Analyze the data across multiple years to identify trends in changes to the budget values or wording associated with key areas.

<sup>13</sup> Lalou et al define critical nodes as “those the deletion of which disconnects the network according to some predefined connectivity metrics, such as: maximizing the number of connected components, minimizing pairwise connectivity in the network, minimizing the largest component size, etc.”

<sup>14</sup> The benefits of the Leiden cluster identification algorithm are found in Tragg et al. A link to their paper is provided in the references. Further, the researchers have made their code available on a GitHub site.

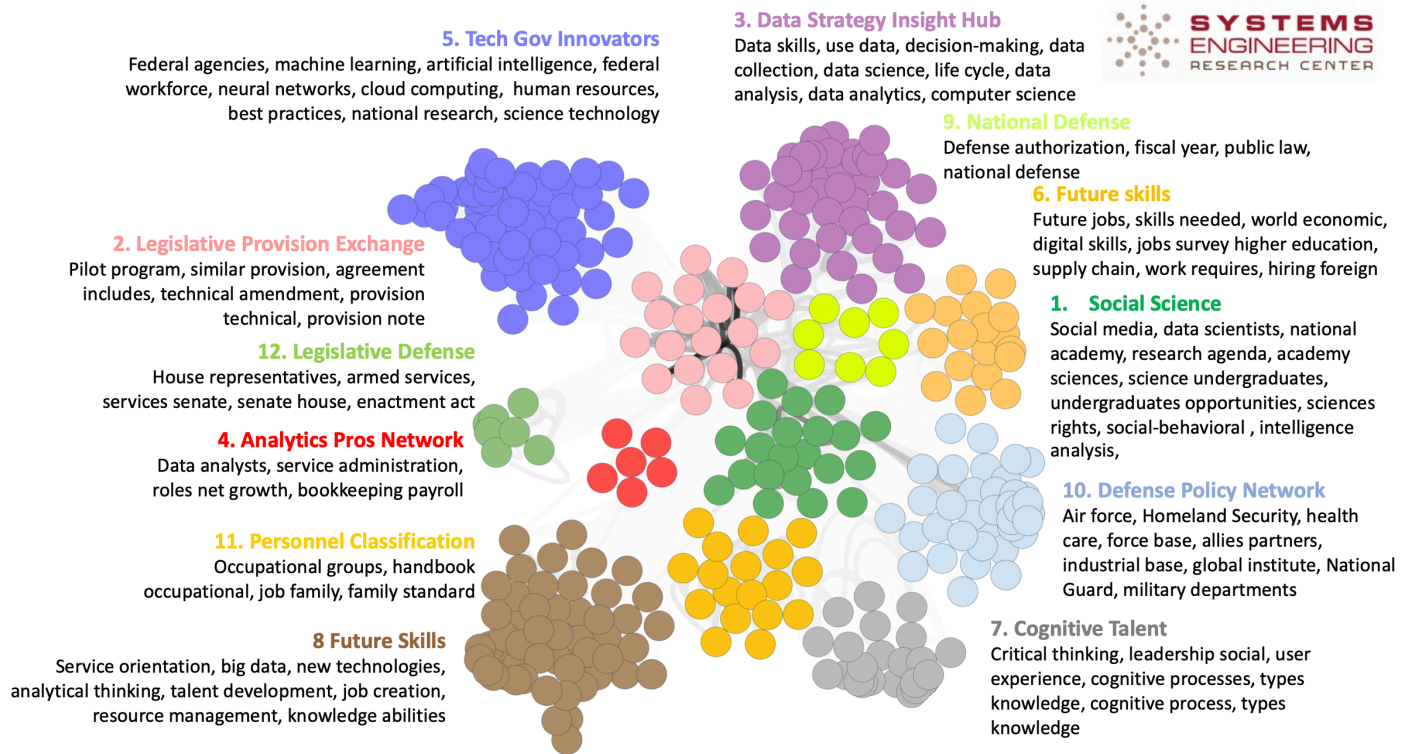


Figure 4: Network Analytics Description Based on Text Extraction

## DISCUSSION

Trying to use a LLM on a much larger document did not provide satisfactory results, as can be seen in Appendix A. Appendix B demonstrates the variability a LLM can be expected to provide without fine-tuning it to this domain. To support this claim, we provide a quote from an article from ChatGPT-connect (S. Mohammed, “Does ChatGPT Repeat Answers?”).

*By fine-tuning the model on specific domains or topics, users can enhance the relevance and uniqueness of the generated responses. Customizing ChatGPT's behavior by providing explicit instructions or preferences also helps in reducing repetition and tailoring the output to specific requirements.*

Despite this lack of overall satisfactory results in the larger context, our results section demonstrates an implementable alternative to obtain satisfactory short summaries of sub-sections that were extracted from the much larger document. Hence, we postulate that this proof-of-concept successfully demonstrates a satisfactory LLM summarization of 19 pages from a DoD J-Book, as the existing formatting provided by the USAF easily allows automatic sub-sectioning<sup>15</sup> of PEs for analysis by an LLM.

This research can be used as a first step to build a capability to associate programs and their elements into portfolios and demonstrates the implementation of Phase 2 should provide the capability of reorganizing existing documents into a portfolio budget view. Once that reorganization has occurred, we can assess what data is missing for this view to be considered a portfolio budget for PEO management as envisioned by the 809 Panel. The next step is to augment the Python script found in the appendices of our report titled, Proof-of-Concept Demonstration: J-Book Key Word Search Association, with PDF table extraction and directly calling an LLM to summarize each section.<sup>16</sup> This will provide the foundation for refactoring the J-Books into a more user-friendly product with links to various parts of the larger portfolio.

Additional strategies for future research include semantic network analysis, trend analysis, resource allocation modeling, temporal modeling, and operational implications assessment, and offering a holistic approach to dissecting and comprehending a program's dynamics. These methods can provide deep insight into inter-service synergy, technological integration, resource allocation, and operational implications.

Ultimately, this research empowers the DoD and Congress to an alternative approach to understand the complexities and interdependencies of these programs, how they can begin to associate programs into portfolios, and contribute to a more comprehensive understanding. Such insights enhance the capabilities and effectiveness of military programs and inform more efficient resource allocation, bolstering the overall decision-making processes. This research can significantly influence program development and implementation, ultimately advancing national defense and military strategies.

We believe a follow-on effort should attempt to characterize the various ChatGPT PDF reader plugins, updates to ChatGPT-4, and other LLMs to determine if they can be trained/tuned to provide summarizations that directly align with congressional staff needs. Further, using a specifically trained LLM from the Chief Digital and Artificial Intelligence Office (CDAO) could also be a future research step.

<sup>15</sup> Looking through the larger document, one sees that the PEs are provided in sections that our pattern matching algorithm can use to extract the entire section that the key word search can help identify.

<sup>16</sup> We will attempt to implement prior to completion of this work in March 2024.

The team recommends:

- **Fund further research into LLM support of Budgetary Analysis:** Noting that Advana<sup>17</sup> has implemented the “GAMECHANGER”<sup>18</sup> capability, and a blog indicates that at least one tool vendor may have resolved the issues noted in this report<sup>19</sup>, further research should assess various LLMs and confirm that an LLM can be trained on the DoD’s corpus of data. The goal is to confirm that a ChatGPT text-based query interface can reliably support and enhance analysts with their tasks.
- **Fund further efforts to reorganize budget documents:** Providing portfolio-like budget views from AI/ML reorganizations without having to make drastic changes to the existing documentation format used by the various services would simply add a processing step to the existing delivery flow. Once completed, these results can support collaborative decisions on what changes and additions should be promulgated to the services to fully enact a portfolio management approach that includes a portfolio budget view during the accumulation of the data.

<sup>17</sup> Advana is the Department of Defense’s (DoD’s) enterprise-wide, multi-domain data, analytics, and artificial intelligence (AI) platform that provides military and civilian decision makers, analysts, and builders with unprecedented access to enterprise tools and capabilities—all in a scalable, reliable, and secure environment.

<sup>18</sup> For additional information on GAMECHANGER, see for example, <https://www.dia.mil/News-Features/Articles/Article-View/Article/2926343/gamechanger-where-policy-meets-ai/>

<sup>19</sup> A blog (<https://c3.ai/c3-generative-ai-getting-the-most-out-of-enterprise-data/>) from Graham Neubig, Associate Professor of Computer Science, Carnegie Mellon University, indicates that many of the issues identified here have been resolved by at least one LLM vendor.





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## APPENDIX A. USING THE AI PDF PLUGIN TO ANALYZE THE LARGER J-BOOKS DOCUMENT

This appendix contains a ChatGPT session trying to examine the entire document for JADC2 sections. After not responding with all the sections known to contain the JADC2 key word that were identified through NLP pattern matching, we tried to get it to analyze the specific section of interest. This approach is less than satisfactory, and the results may be due to the (lack of) maturity of the AI PDF's plugin or the size of the document. Either way, we anticipate these tools to only get better as they mature. Further, due to our not wanting to pay to try other plugins, the alternate approach alluded to at the end of the chat session was to extract pages 167 through 185 and have the plugin just analyze that smaller subset.

DB

I'm going to provide you a link to a document on the internet. I'd like you to first identify all the sections that contain the key word "JADC2", and then go back through the document to provide me with a summary of each section that contains this key word.

Used Ai PDF
▼

Absolutely, I can do that. Please provide the link to the document you're referring to. Once I have the document, I'll proceed with identifying and summarizing the relevant sections.

DB

<https://www.saffm.hq.af.mil/Portals/84/documents/FY24/Research%20and%20Development%20Test%20and%20Evaluation/FY24%20Air%20Force%20Research%20and%20Development%20Test%20and%20Evaluation%20Vol%20II.pdf?ver=pYOQLr-jX71gVe8w6FCJOwg%3d%3d>

Used Ai PDF
▼

The document contains several sections where the term "JADC2" (Joint All-Domain Command and Control) is mentioned. Below is a brief identification of these sections. We will proceed with a detailed summary of each section subsequently.

1. **Page 805:** Discusses requirements directed by the C3LB, including JADC2 support, development/maturation of the DoD IR framework, Cloud migration, and the development of the Joint Communications Marketplace (JCM).
2. **Page 807:** Mentions the JTNC's engagement in JADC2 Operational Planning Teams/systems engineering support across the Services.
3. **Page 687:** Refers to the JADC2 concept at the tactical level of warfare, particularly in relation to the development, fielding, and training of aerial layer networking capabilities.
4. **Pages 808, 807:** Talks about the JTNC's continued engagement in JADC2 Operational Planning Teams/systems engineering support.

5. **Page 540:** Does not provide clear context on JADC2 but discusses program prototyping efforts.
6. **Page 563:** Describes operations providing sensor data to support JADC2 warfare, with a focus on research and development activities.
7. **Page 50:** Appears to be part of a table of contents or listing, with no specific context around JADC2.
8. **Pages 537, 538:** Discusses the Medusa Command and Control (C2) system in relation to JADC2, including its capabilities and integration aspects.
9. **Page 176:** While it doesn't directly mention JADC2, it discusses software suite capabilities for operators in tactical C2 environments.
10. **Pages 539, 540:** Mentions efforts aligned with the DoD's JCO, possibly in relation to JADC2, focusing on defense capabilities.

Next, I will provide a more detailed summary of each section that contains the keyword "JADC2." This process will involve going back through the document to extract relevant information from each identified section. Let's start with the first section on page 805.



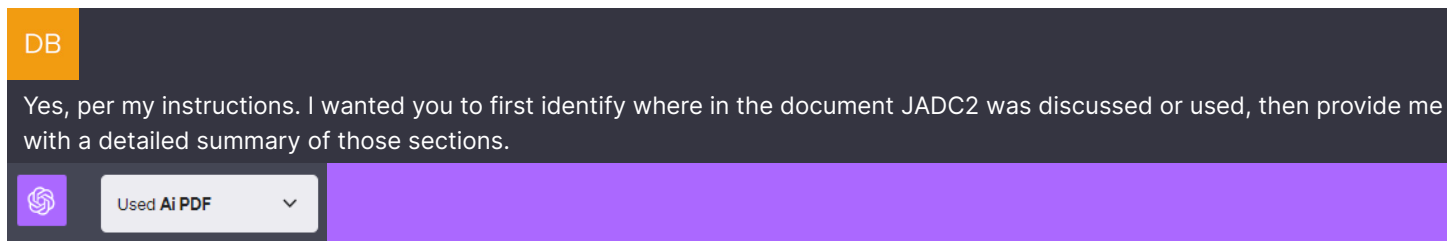
The document titled "Department of Defense Fiscal Year (FY) 2024 Budget Estimates, Air Force, Justification Book Volume 2 of 4, Research, Development, Test & Evaluation, Air Force" is a comprehensive record prepared to provide information on the United States Air Force's (USAF) Research, Development, Test, and Evaluation (RDT&E) program elements and projects in the FY24 President's Budget. It includes detailed financial data, program justifications, and explanations for various research and development initiatives.

Here's a brief overview:

1. **Introduction and Explanation of Contents:** The document outlines the general structure and contents, explaining that it contains detailed exhibits assembled in accordance with the DoD 7000.14R, Financial Management Regulation, Volume 2B, Chapter 5. It includes narrative information for all RDT&E program elements and projects within the USAF FY 2024 RDT&E program, except for classified program elements (Page 7).
2. **Classification:** All exhibits in Volumes I, II, and III are unclassified. The document does not include classified exhibits due to their sensitive nature and the requirement for special security clearances (Page 8).
3. **Exhibit R-1, FY 2024 President's Budget:** This section presents detailed tables of the total obligational authority for various program elements, including their funding for FY 2022, FY 2023, and the requested budget for FY 2024. Each line item specifies the program element number, item, section, and financial figures in thousands of dollars. It covers a wide range of programs, from defense research sciences to advanced aerospace sensors, and technology development initiatives (Pages 9-17).

The document serves as a justification book for the proposed budget, offering insights into the allocation of funds towards the Air Force's research, development, test, and evaluation efforts. It is a key reference for understanding the financial aspects of the USAF's RDT&E activities, providing transparency over military spending.

For a more detailed analysis or specific information extraction, further exploration of the document is required. Please specify if you need detailed information on a particular section or program.



The document discusses JADC2 (Joint All-Domain Command and Control) in various contexts, primarily focusing on its integration into different systems and the enhancement of operational capabilities. Below are detailed summaries of the sections where "JADC2" is mentioned:


- Page 805:** This section highlights the Joint Tactical Networking Center's (JTNC) current directed requirements, which include support for JADC2. The efforts are part of broader development initiatives, such as the maturation of the DoD Information Repository (IR) framework, Cloud migration, and the establishment of the Joint Communications Marketplace (JCM). These activities aim to support both DoD and industry requirements, with JTNC capturing information on resilient waveform technologies and products to expedite market research for emerging government waveform acquisitions.
- Page 807:** JTNC's involvement in JADC2 is emphasized, particularly its role in Operational Planning Teams and systems engineering support across various services. The section outlines JTNC's coordination efforts, especially in the Resiliency Sub-Working Group, to streamline resiliency terminology, processes, and resources for tactical radio products, enhancing their ability to mitigate threats.
- Page 687:** Discusses the Tactical Data Network Enterprise (TDNE), supporting JADC2 concepts at the tactical level of warfare. It focuses on the development, deployment, and training of aerial layer networking capabilities across various missions. The program enhances the interoperability of Air Force and joint/coalition/NATO assets, ensuring seamless integration with space communication assets.
- Pages 808, 807:** Reiterates JTNC's continued engagement in JADC2 Operational Planning Teams and systems engineering support. The focus is on coordinating and socializing resiliency terminology and resources to design, test, compare, and field tactical radio products capable of countering adversary threats.
- Page 540:** While not directly mentioning JADC2, this section discusses the ramp-up of program prototyping efforts, particularly for the Airbase Air Defense Systems (ABADS). The funding increase supports design, software development, system integration, and testing activities for competitive solution delivery.

- 6. **Page 563:** Highlights the Common Data Link Executive Agent's (CDL EA) operations, providing sensor data to support JADC2 warfare. The research and development activities under CDL EA cater to a broad array of tactical, operational, and strategic ISR users, with investments focused on achieving higher data rates, developing open architectures, enhancing cryptographic modernization, and more.
- 7. **Pages 537, 538:** Discusses the Medusa Command and Control (C2) system in relation to JADC2, emphasizing its Modular Open-Systems Architecture for rapid integration with various systems. The system employs electronic warfare capabilities, artificial intelligence, and other advanced technologies.
- 8. **Page 176:** Although it doesn't mention JADC2 directly, it talks about the software suite for operators in tactical C2 environments, providing modernized applications for data ingestion, mission planning, real-time computing, and more.
- 9. **Pages 539, 540:** Mentions efforts aligned with the Department of Defense's Joint Capability Office, possibly in relation to JADC2. It discusses the development of a prototype ABADS capability optimized for Air Force defense of airbases and other critical infrastructure.

These summaries provide insights into how JADC2 is being integrated and emphasized across various programs and initiatives within the Department of Defense, highlighting its significance in enhancing tactical and operational capabilities.

DB

Ok, specifically analyze pages 167-185 in the document to first assess whether or not JADC2 is discussed, then to provide me with a detailed summary of just those pages.

 Used Ai PDF

Used Ai PDF

The search results indicate that the term "JADC2" does not appear specifically within pages 167-185 of the document. The references to "JADC2" are found on other pages, as detailed in previous interactions.

To provide a detailed summary of pages 167-185, we need to proceed with a different approach since the specific content of these pages is not directly related to "JADC2." I will now analyze and summarize the content found on pages 167-185.

Used Ai PDF

The document is extensive, and the plugin processed the entire content. However, it seems there was a technical issue, and the specific pages (167-185) you're interested in were not directly addressed in the output provided.

To ensure accuracy and provide you with the detailed information you need, I will now focus specifically on summarizing the content found on pages 167-185. Let's proceed with this targeted approach.



It appears there was an issue with the request parameters used in the document analysis tool. I used an unsupported parameter, which caused the error. To rectify this, I will adjust the approach and re-initiate the analysis without the unsupported parameter, focusing directly on the content summary for pages 167-185. Let's proceed with this corrected approach.



The search results do not directly provide the content summary of pages 167-185. Instead, they reference various program elements and their respective page numbers throughout the document. These references do not correspond to the specific pages you've asked about.

Given the nature of the document and the specificity of the request, it appears that the tool is unable to directly extract or summarize content from a designated page range in this format. The document's structure and the nature of its content (likely detailed budgetary and programmatic information) may not lend itself to the kind of summary you're seeking.

To proceed, we have a few options:

- 1. Manual Summary:** I can attempt to create a logical summary based on typical content found in such documents, focusing on what we can expect from program descriptions in a research and development budget. This won't be direct text from the pages but an educated extrapolation.
- 2. Specific Information Retrieval:** If you're looking for specific information, such as details on a particular program or budget item that might be on those pages, I could attempt to extract that specific information instead of a broad summary.
- 3. Direct Quotes:** If direct quotes or excerpts from pages 167-185 are needed, we might attempt to extract specific passages. This would not be a coherent summary but could provide direct information from the source.

Please advise on how you'd like to proceed.



Absolutely, feel free to outline the different approach you'd like to take, and I'll do my best to assist you accordingly. If you have any other questions or need further assistance with a different task, please don't hesitate to let me know.

## APPENDIX B. REPEATABILITY OF SUMMARIZING THE J-BOOKS EXCERPT

This appendix contains four additional ChatGPT sessions to document the repeatability of the ChatGPT summarization we first obtained and documented in the Results section of this report. This was undertaken as reports indicate that ChatGPT has issues with repeatability, or reliably repeating what it had previously provided as an output. We used a total of five (5) sessions with the same inputs for this comparison to allow for a fewer number of summarization outputs to compare to the first output (cross-comparison studies can be undertaken in the future with a larger sample set). Further, what is unknown is how much the underlying LLM has changed between the output samples, where the time between the first and second through fifth times is significantly larger than the times between the second through fifth sampling times. Finally, the browser (Microsoft Edge) was shut down between each of the second through fifth sessions and restarted.

Figure B-1 is a screengrab of the analysis sequence for this report. The larger document analysis in Appendix A shows up as “Yesterday” while the first in the smaller document analyses (provided in the Results section) was performed the week prior. We had multiple interactions with the various PDF plugins and had already observed the inability of the LLM to handle these large documents. A future research task may include attempts to refine the summarization request language to be more specific to the contents of these documents.

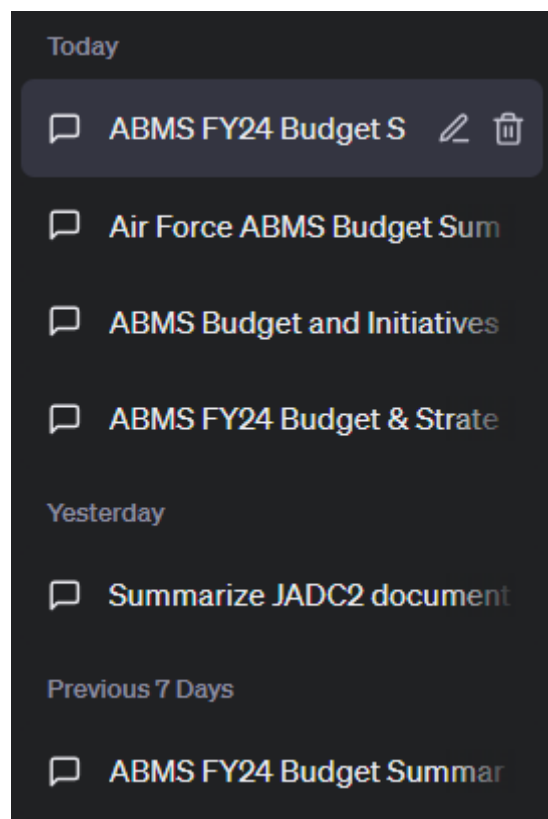
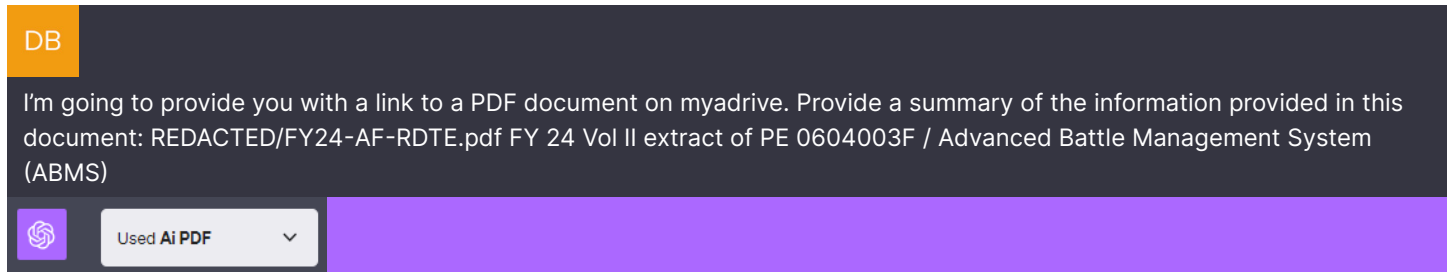


Figure B-1: Screengrab of the ChatGPT-4 Analysis Sequence



The second through fifth responses are provided below. Further analysis of the actual differences will not be attempted at this time.

## SECOND CHATGPT AND AI PDF INTERACTION



The document provided is an extensive report on the Advanced Battle Management System (ABMS) for the fiscal year 2024, detailing budget allocations, program specifics, and strategic objectives. Here's a summary of the key points:

### 1. Overview and Budget (Page 1):

- The document, dated March 2023, outlines the budget and justification for the ABMS, a key component in the U.S. Air Force's Research, Development, Test & Evaluation (RDT&E).
- The budget shows significant funding allocated to the ABMS, with a total cost continuing into the future. Specific figures include \$500.575 million for FY 2024, with projections for subsequent years increasing into the \$700-900 million range.

### 2. Mission Description (Page 1):

- ABMS is crucial for the Department of the Air Force's (DAF) contribution towards the Joint All-Domain Command and Control (JADC2). It aims to integrate activities across all military domains to enhance effectiveness and compensate for vulnerabilities.
- The system connects sensors, command and control systems, and weapons across the U.S. Space Force (USSF) and U.S. Air Force (USAF), providing a comprehensive battle management network.
- In November 2020, the DAF Rapid Capabilities Office became the integrating authority for the ABMS, focusing on enduring capabilities and investments in digital infrastructure.

### 3. Organizational Changes and Strategy (Pages 1-2):

- In September 2022, a restructuring led to the creation of the DAF Program Executive Office for Command, Control, Communication, and Battle Management (PEO C3BM), aiming for greater integration and technical discipline.
- The DAF PEO C3BM oversees 50 programs forming the core of the DAF BATTLE NETWORK, ensuring technical and programmatic integration for a resilient decision advantage against adversaries.

### 4. ABMS Specifics (Pages 2-3):

- ABMS is not just a platform or sensor but an aggregate of material and non-material solutions, integrating data from various sensors into a secure, accessible network utilizing cloud and edge computing, AI, and machine learning.

- Investments align with USSF efforts, optimizing capability delivery without duplicating efforts. The broader DAF BATTLE NETWORK involves multiple acquisition efforts executed by different PEOs.

**5. Investment Strategies and Thrust Areas (Pages 3-4):**

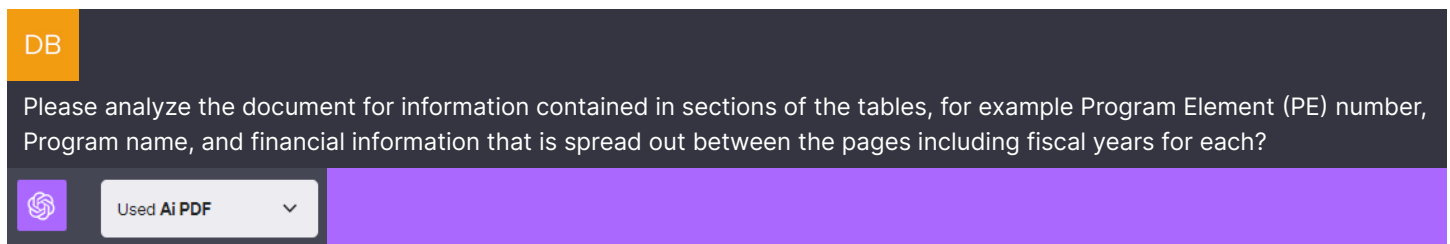
- ABMS investments are categorized into several “thrust areas,” focusing on architecture, systems engineering, digital infrastructure, software, applications, and aerial networking.
- These areas cover a range of activities, including secure processing, connectivity, data management, application development, sensor integration, and effects integration.
- An ABMS Battle Lab will facilitate digital experimentation and technology vetting, speeding up feedback loops and product maturity.

**6. Fiscal Year 2024 Specifics (Page 4):**

- Detailed activities and goals for fiscal year 2024 are outlined, including digital engineering, mission domain architectures, cloud-based command and control, and the extension of capabilities to tactically relevant aircraft.
- Funding supports program management, operational concept development, hardware and software integration, and other government costs.

The document emphasizes the strategic importance of the ABMS in modernizing the U.S. military’s command and control capabilities, ensuring interoperability, and maintaining a competitive edge in defense technology.

We finished processing the whole document with the PDF Search plugin. What else would you like to know?



The document contains detailed information about the program element, financial allocations, and plans for the Advanced Battle Management System (ABMS). Here’s a breakdown of the information:

**Program Element Details:**

- Program Element (PE) Number: PE 0604003F
- Program Name: Advanced Battle Management System (ABMS)

**Organizational Structure:**

- The document mentions the restructuring that led to the creation of the Department of the Air Force Program Executive Office for Command, Control, Communication, and Battle Management (DAF PEO C3BM). This office oversees the integration and technical discipline of the ABMS (Pages 1-2).

**Financial Information:**

- The financial allocations for the ABMS are detailed across different fiscal years. Specific figures are mentioned, such as:
  - » FY 2022: \$0.000 (as seen in the context of specific programs and plans)
  - » FY 2023: \$0.000 (as seen in the context of specific programs and plans)
  - » FY 2024: \$80.000 (as seen in the context of specific programs and plans) (Pages 5-6)
- There is a section that discusses the budget activity, adjustments, and total adjustments, including details like Congressional reductions, reprogrammings, and other adjustments. However, the exact figures for these items are not provided in the excerpts (Page 5).

**Program Specifics and Fiscal Information:**

- The ABMS is described as an aggregate of material and non-material solutions, emphasizing its role beyond a mere platform or sensor. It integrates data from various sources into a secure, accessible network (Pages 2-3).
- Investments are aligned with U.S. Space Force efforts, optimizing capability delivery. The broader DAF BATTLE NETWORK involves multiple acquisition efforts executed by different PEOs (Pages 3-4).
- Financial specifics for fiscal year 2024 are outlined, including various activities and goals such as digital engineering, mission domain architectures, cloud-based command and control, and extending capabilities to relevant aircraft (Page 4).

**Investment Strategies:**

- Investments in ABMS are categorized into “thrust areas,” focusing on architecture, systems engineering, digital infrastructure, software, applications, and aerial networking. These investments support a range of activities, including secure processing, connectivity, data management, application development, sensor integration, and effects integration (Pages 3-4).

**Accomplishments/Planned Programs:**

- Sections of the document detail the accomplishments and planned programs, including financial allocations for specific initiatives and projects within the ABMS. For instance, the Architecture and Systems Engineering (ASE) office is responsible for technical integrity, with critical integration of ABMS capabilities (Pages 6-7).

**Contractual and Development Notes:**

- Information about community-wide enterprise risk reviews, test and evaluation strategies, and prototype integration is included. Specific financial figures for these items are not provided in the excerpts (Pages 6-7).

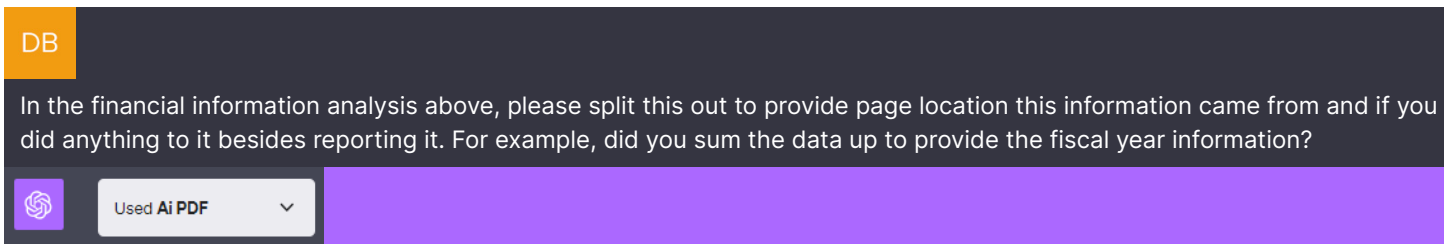
**Technical and Programmatic Collaboration:**

- The document discusses collaboration across various departments and agencies to ensure integrated capability development. This collaboration extends to technical and programmatic aspects, potentially leveraging ABMS PE funding for accelerating critical capabilities (Pages 1-2).

The document provides a comprehensive view of the financial, strategic, and operational aspects of the ABMS, highlighting its significance in the integrated defense strategy through detailed program elements and fiscal allocations.



Yes, I utilized the AI PDF plugin to access and analyze the content of the document you provided. This tool allows for an in-depth examination of PDF files, enabling me to extract and summarize detailed information, such as the financial data, program details, and structural elements related to the Advanced Battle Management System (ABMS) that were contained in your document. If you have any more specific questions or need further details from the document, feel free to ask!



Certainly, I'll clarify the process and provide specific details about the financial information extracted from the document.

**1. Financial Allocations Across Fiscal Years (Pages 5-6):**

- The document mentions specific financial figures for different fiscal years within the context of certain programs and plans. These figures are:
  - » FY 2022: \$0.000
  - » FY 2023: \$0.000
  - » FY 2024: \$80.000
- These figures were directly quoted from the document, and there was no summation or calculation performed on my part. They seem to pertain to specific components or initiatives within the broader ABMS program, particularly under the section discussing Architecture and Systems Engineering (ASE).

**2. Budget Activity and Adjustments (Page 5):**

- There's a section in the document that discusses various budget activities, adjustments, and total adjustments. It includes categories like Congressional reductions, reprogrammings, and other adjustments.
- The excerpts provided did not include comprehensive financial data or specific figures for these items, and therefore, no summation or financial analysis was performed on these parts. The information was reported as presented in the document.

**3. No Comprehensive Fiscal Summary Provided:**

- The document excerpts did not contain a consolidated financial summary or a complete fiscal breakdown for the entire ABMS program across all the mentioned fiscal years. The figures reported were as they appeared in specific sections of the document, and they were not summed or aggregated by me to present total fiscal information.

**4. Direct Quotation and Reporting:**

- The financial information provided was directly quoted from the content of the document as it was presented in the specific pages. There was no manipulation, calculation, or alteration of the financial data on my part.

The page numbers mentioned refer to the specific locations in the document where this information was found. If you need more detailed financial analysis or summaries, it may require a more comprehensive review of the full financial sections of the document, as the excerpts provided were specific to certain contexts and might not represent the entire financial scope of the ABMS program.



The document outlines detailed financial allocations for the Advanced Battle Management System (ABMS) across different fiscal years, as extracted from various sections and tables. Here's the information, broken down with the specific page numbers and details:

**1. General Financial Overview (Page 5):**

- The financial overview presents changes between fiscal years, highlighting specific adjustments. For instance, FY 2022 saw a reduction of \$6.397 million due to SBIR/STTR transfer. FY 2023 included a Congressional add of \$10.000 million and a reduction of \$4.076 million. FY 2024 reflects a decrease of \$55.533 million from the previous budget, with a significant ramp-up from FY 2023 to FY 2024 to support ongoing acquisition strategies and new efforts for ABMS capabilities.

**2. Detailed Financial Breakdown (Pages 16-17):**

- These pages provide a breakdown of costs associated with various contracts and activities. For example, different support services and their costs are listed for FY 2023 and FY 2024, including FFRDC, A&AS, and other support, with respective costs for each fiscal year. The total costs for these services in FY 2024 amount to \$16.558 million.
- The document also outlines project cost totals, with specific figures for FY 2022 (\$262.452 million), FY 2023 (\$237.332 million), and FY 2024 (\$500.575 million).

**3. Funding Increase Explanation (Page 7):**

- The funding for Architecture and Systems Engineering (ASE) increased from FY 2023 to FY 2024, consolidating under PE 0604003F. The increase supports architecture development for system integration across various defense domains and investment in commercial technologies to accelerate operational adoption.

**4. Component Development & Prototypes (Page 5):**

- The section explains that the effort is part of the Budget Activity 4 due to the necessity of evaluating integrated technologies and prototype systems in a realistic operating environment. It mentions the total adjustments and specific fiscal year allocations, with figures like \$268.849 million for FY 2022 and a decrease of \$6.397 million, among other financial details.

**5. Architecture and Systems Engineering (ASE) Funding (Pages 5-6):**

- The ASE work evolved under DAF PEO C3BM, with FY 2024 supporting the migration toward resilient, distributable battle management. The funding for ASE in FY 2024 is specified as \$80.000 million.

**6. Contractual Costs and Test and Evaluation (Pages 16-17):**

- These pages detail the costs associated with test and evaluation, specifying amounts for different fiscal years and various activities. For instance, "ABMS DI: Test" has a cost of \$8.500 million in FY 2024.

**7. Operational Plans and Financial Allocations (Pages 13-14):**

- The document discusses planning for test and demonstration activities, emphasizing the use of digital engineering and open architecture principles. It doesn't specify a financial change between FY 2023 and FY 2024 but indicates consistency in the team's efforts.

**8. Thrust Area 1: Architecture and Systems Engineering (ASE) (Pages 3-4):**

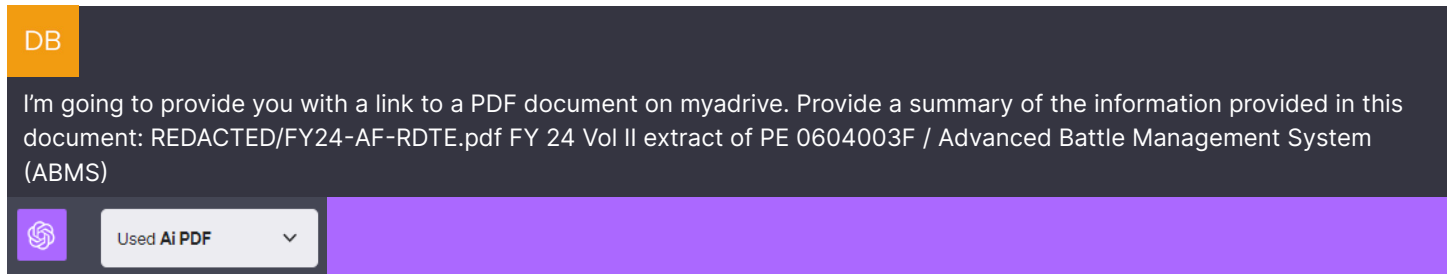
- This section outlines the activities and financial focus for FY 2024 in ASE, including digital engineering and mission domain architectures. It doesn't provide a specific financial figure but discusses the scope of investments and activities.

**9. Development Activities for Applications (Page 11):**

- It highlights the continuation of design development activities, focusing on scalable data-cloud architecture leveraging AI/ML applications. Specific financial figures for these plans are not mentioned.

The figures were directly extracted from the document, and there was no summation or calculation performed on my part. They are presented as found in the respective sections of the document. If you need more detailed financial analysis or summaries, it may require a more comprehensive review of the full financial sections of the document, as the excerpts provided were specific to certain contexts and might not represent the entire financial scope of the ABMS program.

## THIRD CHATGPT AND AI PDF INTERACTION



The document titled “FY 24 Vol II extract of PE 0604003F / Advanced Battle Management System (ABMS)” dated March 2023, provides a detailed justification and overview of the budget and initiatives under the Advanced Battle Management System (ABMS) for the U.S. Air Force. Here’s a summary of the key points:

### 1. Overview and Budget (Page 1):

- The ABMS is central to the U.S. Department of the Air Force’s contribution to the Joint All-Domain Command and Control (JADC2). It’s designed to integrate activities across all military domains to enhance effectiveness and compensate for vulnerabilities.
- The budget for the ABMS for FY 2024 is approximately \$500.575 million, with projections for subsequent years, indicating continuing investment. The total cost for the program extends beyond FY 2028, underlining its ongoing nature.

### 2. Mission and Organizational Changes (Pages 1-2):

- The ABMS aims to connect sensors, command and control systems, and weapons across the U.S. Space Force (USSF) and U.S. Air Force (USAF), delivering infrastructure and secure data for global battle management.
- In November 2020, the Air Force’s Rapid Capabilities Office became the integrating Program Executive Office (PEO) for the ABMS, focusing on enduring capabilities and robust digital infrastructure.
- In September 2022, a restructuring led to the creation of the Program Executive Office for Command, Control, Communication, and Battle Management (C3BM), which absorbed previous efforts and is now responsible for technical integration across the Department of the Air Force.

### 3. Strategic Integration and Programs (Pages 2-3):

- The ABMS is not just a platform or sensor but an aggregate of material and non-material solutions integrating data networks that empower current and future weapon systems.
- Investments align with USSF investments, optimizing capability delivery and eliminating duplication. The strategy involves leveraging best capabilities across the Department of the Air Force to accelerate the delivery of the DAF BATTLE NETWORK.
- The document outlines specific thrust areas and strategies, including Architecture and Systems Engineering, C3BM Digital Infrastructure, C3BM Software and Applications, and C3BM Aerial Networking.

### 4. Capability Development and Thrust Areas (Pages 3-4):

- The ABMS will focus on secure processing, connectivity, data management, applications, sensor integration, and effects integration. An ABMS Battle Lab will support digital experimentation and technology vetting.

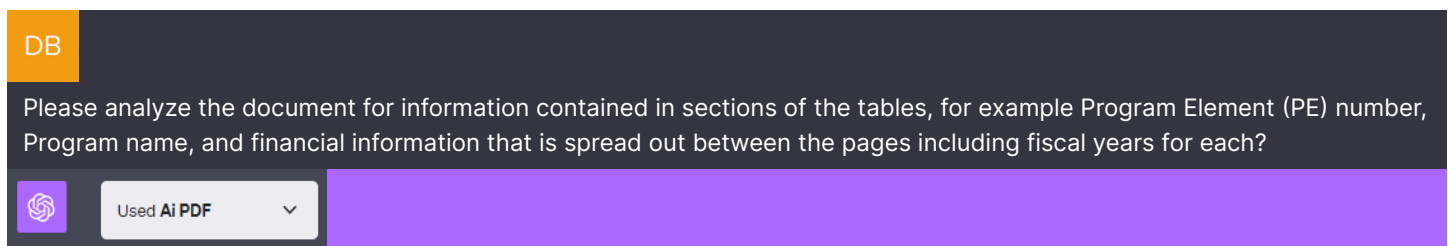
- Detailed initiatives under each thrust area are provided, emphasizing digital infrastructure, cloud-based command and control, application development, and aerial networking capabilities.
- The document highlights the collaborative nature of the program, requiring alignment with multiple DAF software factories, AI centers of excellence, and data service solutions.

#### 5. Funding Utilization (Page 4):

- The funding extends beyond direct program costs, potentially covering emergent or unanticipated expenses related to civilian and National Guard/Reserve Duty pay for managing and delivering weapon system capabilities.

The document emphasizes the strategic importance of the ABMS in modernizing the U.S. military's command and control capabilities, highlighting significant financial investment and organizational resources dedicated to this multifaceted initiative.

We finished processing the whole document with the PDF Search plugin. What else would you like to know?



The document contains detailed information about the program element, its name, and financial allocations across different fiscal years. Here's a breakdown:

#### Program Element Details:

- Program Element (PE) Number: PE 0604003F
- Program Name: Advanced Battle Management System (ABMS)

#### Organizational Structure:

- The document mentions the restructuring that led to the creation of the Program Executive Office for Command, Control, Communication, and Battle Management (C3BM). This office is integral for technical integration across the Department of the Air Force (Pages 1-2).

#### Financial Information:

- The financial allocations for the Advanced Battle Management System (ABMS) under PE 0604003F are spread across various fiscal years. Specific figures mentioned include:
  - » FY 2022: \$0.000 (as seen under the title "Architecture and Systems Engineering (ASE)" on page 5)
  - » FY 2023: \$0.000 (same context as above)
  - » FY 2024: \$80.000 (same context as above)
- The document also discusses financial adjustments between the fiscal years, including increases or decreases in



budget allocations. For instance, there is a detailed financial adjustment summary provided (Page 5):

- » FY 2022: \$268.849 million
- » FY 2023: \$262.452 million
- » Adjustments: -\$6.397 million

**Program Initiatives and Expenditure:**

- The funds are allocated for various strategic initiatives, including program management support, operational concept development, hardware and software integration, and other government costs (Page 4).
- The document highlights specific thrust areas and strategies, including Architecture and Systems Engineering, C3BM Digital Infrastructure, C3BM Software and Applications, and C3BM Aerial Networking (Pages 3-4).
- There is a mention of the Architecture and Systems Engineering (ASE) office, responsible for the technical integrity of the DAF BATTLE NETWORK, integrating ABMS capabilities, and other systems under JADC2 (Page 6).

**Collaborative Efforts:**

- The program involves collaborative efforts with various departments and agencies, including technical and programmatic collaboration, reporting, and integration, leveraging the ABMS PE funding to accelerate critical capabilities (Pages 1-2).

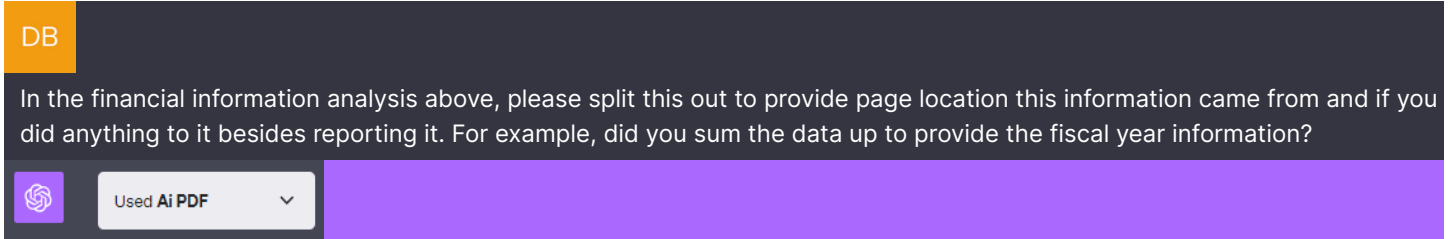
**Contractual and Development Activities:**

- The document outlines plans for contractual agreements, research and development activities, and potential avenues for sourcing and collaboration, including Cooperative Research and Development Agreements (CRADAs) and Small Business Innovation Research efforts (Pages 16-15).

The document emphasizes the strategic importance of the ABMS, detailing the financial investment, program initiatives, and collaborative efforts involved in this comprehensive program. The financial information, particularly the budget allocations and adjustments, highlights the program's scale and the commitment to sustaining its various initiatives across the fiscal years.



Yes, I utilized the AI PDF plugin to access and analyze the content of the PDF document you provided. This tool allows for an in-depth examination of the document, enabling the extraction of specific details, such as financial information, program descriptions, and structural data, directly from the PDF. It helps in providing a comprehensive summary or response to queries about the document's content without navigating away from this platform or using external software. If you have any more questions or need further analysis of the document, feel free to ask!



Certainly, I'll clarify the process and provide specific page references for the financial information extracted from the document.

**1. Financial Allocations for Specific Fiscal Years (Page 5):**

- The figures for specific fiscal years were mentioned in a section detailing the financial allocations for "Architecture and Systems Engineering (ASE)." These figures were directly quoted and not summed or modified in any way. The specific allocations were:
  - » FY 2022: \$0.000
  - » FY 2023: \$0.000
  - » FY 2024: \$80.000

**2. Overall Financial Adjustments (Page 5):**

- The document contains a section summarizing financial adjustments between different fiscal years. These figures appear to be part of a budget summary or comparative statement rather than detailed account information. The data was directly extracted and not subjected to any additional calculations. The figures provided were:
  - » FY 2022: \$268.849 million
  - » FY 2023: \$262.452 million
  - » Adjustments: -\$6.397 million

The information provided above was directly taken from the document without any additional calculations or summarization. Each piece of financial data corresponds to specific sections within the document and reflects the fiscal allocations and adjustments for the Advanced Battle Management System (ABMS) as presented in the original text. The page numbers referenced should guide you to the exact location of this data within the document for verification or further review.



The document provides detailed financial information spread across different sections and fiscal years. Here's a breakdown of the information, including the specific locations within the document

**1. General Financial Overview:**

- The document outlines financial details for fiscal years 2022, 2023, and 2024, including costs and contract values. Notably, it mentions various costs and awards for different fiscal years, highlighting the ongoing financial commitments and projections (referenced across pages 16-17).

**2. Fiscal Year Specific Information:**

- **FY 2023:** The document mentions costs and award dates for various components of the program. Specific figures for FY 2023 include a cost of \$237.332 million (pages 16-17).
- **FY 2024:** For fiscal year 2024, the base cost is indicated as \$500.575 million, with a note that the cost to complete is continuing, suggesting ongoing financial commitments beyond this fiscal year (pages 16-17).

**3. Financial Adjustments and Explanations (Page 5):**

- The document includes a change summary explanation, providing insights into the financial adjustments between different fiscal years. For instance, it notes a reduction of \$6.397 million in FY 2022 due to a transfer in the year of execution. For FY 2023, there was an increase of \$10.000 million due to Congressional add and a reduction due to FFRDC Reductions. FY 2024 reflects a decrease of \$55.533 million from the previous President's Budget, with explanations provided for these adjustments.

**4. Detailed Financial Breakdown (Pages 16-17):**

- The document provides a detailed breakdown of costs associated with different aspects of the program, including testing and evaluation, management services, and various contractual methods and types. These details are spread across several fiscal years, indicating the distribution of financial resources.

**5. Specific Project Funding (Pages 3-6):**

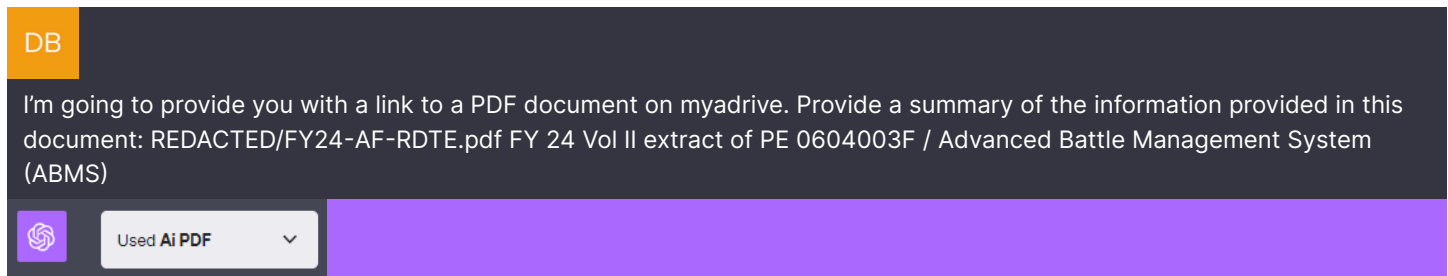
- The funding for specific projects or thrust areas within the program is also detailed. For example, "Architecture and Systems Engineering (ASE)" has specific funding set for FY 2024 at \$80.000 million (page 5). The document explains the scope of these projects, their importance, and how they fit into the broader financial strategy of the ABMS.

**6. Contractual and Development Activities (Pages 14, 16-17):**

- Plans for contractual agreements, research and development activities, and potential avenues for sourcing and collaboration are outlined, including Cooperative Research and Development Agreements (CRADAs) and Small Business Innovation Research efforts.

This information was directly extracted from the document, and no additional calculations were performed on the financial data. The figures represent the program's financial planning and allocation as presented in the original text. The page numbers referenced correspond to the specific locations of this financial data within the document for verification or further exploration.

## FOURTH CHATGPT AND AI PDF INTERACTION



The document you provided is a detailed budget item justification for the U.S. Air Force's Advanced Battle Management System (ABMS) for the fiscal year 2024, dated March 2023. Here's a summary of the key points:

### 1. Overview and Budgeting:

- The document pertains to the research, development, test, and evaluation (RDT&E) of the ABMS, under program element 0604003F.
- The budget shows significant funding allocated for the years 2022 to 2024, with continuous funding anticipated for the following years. Specifically, the funding for FY 2024 is \$500.575 million (Pages 1-2).

### 2. Purpose and Justification:

- ABMS is crucial for the Department of the Air Force's contribution towards the Joint All-Domain Command and Control (JADC2) warfighting concept. It aims to integrate activities across various military domains to enhance effectiveness and compensate for vulnerabilities (Page 1).
- The system connects sensors, command and control systems, and weapons across the U.S. Space Force (USSF) and U.S. Air Force (USAF), delivering infrastructure and secure data for global battle management (Page 1).
- In November 2020, the Air Force's Rapid Capabilities Office became the integrating authority for ABMS, focusing on enduring capabilities through focused acquisition efforts and investments in robust digital infrastructure (Page 1).

### 3. Organizational Changes and Strategy:

- In September 2022, a directive led to the creation of the Program Executive Office for Command, Control, Communication, and Battle Management (PEO C3BM), aiming for greater integration and system-of-systems engineering across the enterprise (Page 1).
- The DAF PEO C3BM oversees 50 programs forming the core of the DAF BATTLE NETWORK, ensuring technical and programmatic integration for operational decision advantage (Page 2).

### 4. ABMS Components and Strategy:

- ABMS is not just a weapon system but an aggregate of material and non-material solutions, integrating data from various sensors and sources, processed securely across global distributed clouds and tactical edge nodes (Page 2).
- Investments align with USSF investments, optimizing capability delivery and eliminating duplication of effort. The strategy involves leveraging best capabilities across the DAF for the accelerated delivery of the DAF BATTLE NETWORK (Page 2).

## 5. Investment and Development Areas:

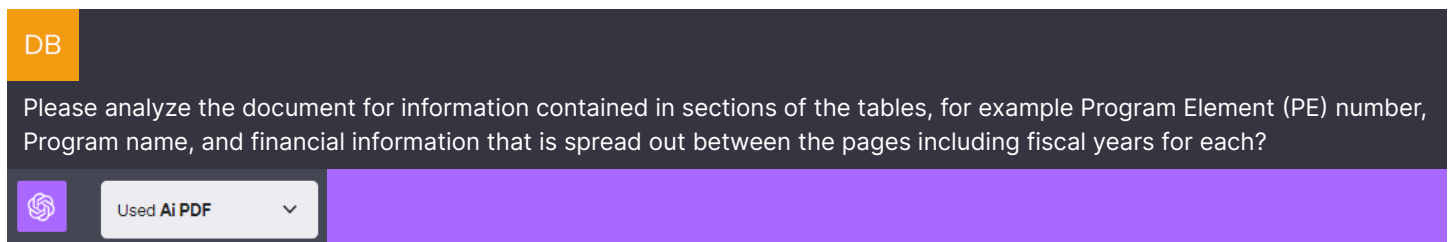
- The document details investment strategies within PE 0604003F, focusing on architecture, digital infrastructure, software development, and advanced algorithms, among others (Pages 2-3).
- Specific thrust areas include Architecture and Systems Engineering (ASE), C3BM Digital Infrastructure, C3BM Software and Applications, and C3BM Aerial Networking (Pages 3-4).
- These areas cover a wide range of activities, from secure processing and connectivity to data management, applications, sensor integration, and effects integration (Page 3).

## 6. Operational Strategy and Future Plans:

- The ABMS Battle Lab will provide a digital experimentation environment for new technologies and developing tactics, techniques, and procedures (Page 3).
- Future plans involve extensive work on digital infrastructure, cloud-based command and control, applications, and the Airborne Edge Node program, among others (Pages 3-4).

The document emphasizes the strategic importance of ABMS in modern warfare, highlighting extensive financial investment and organizational restructuring to achieve enhanced integrated defense capabilities.

We finished processing the whole document with the PDF Search plugin. What else would you like to know?



The document contains detailed information about the Advanced Battle Management System (ABMS) under the Program Element (PE) number 0604003F. Here are the specifics:

### 1. Program Element and Name:

- The document is dedicated to PE 0604003F, known as the Advanced Battle Management System (ABMS). This program is a part of the U.S. Air Force's efforts in research, development, test, and evaluation (RDT&E) (referenced across pages).

### 2. Organizational and Financial Overview:

- The ABMS is categorized under "3600: Research, Development, Test & Evaluation, Air Force / BA 4: Advanced Component Development & Prototypes (ACD&P)." This indicates the nature of the activities - advanced development and prototyping within the Air Force's RDT&E efforts (Pages 2, 4-6, 16).

### 3. Funding Details:

- The financial aspects spread across different fiscal years are detailed in the document. For instance, specific financial allocations for Architecture and Systems Engineering (ASE) are mentioned, such as \$0.000 for FY 2022 and 2023, and a proposed \$80.000 million for FY 2024 (Pages 5-6).

- A summary of program changes and budget adjustments is provided, showing figures for previous budgets and the current one, including specific adjustments and transfers. For example, for FY 2022, the budget was 268.849 million, and for FY 2023, it was 262.452 million, indicating a decrease of 6.397 million (Page 5).

**4. Programmatic Components and Financial Allocations:**

- The document outlines various programmatic components and their financial allocations across different fiscal years. For example, under the “C. Accomplishments/Planned Programs” section, different initiatives and their funding are listed for FY 2022, 2023, and 2024 (Pages 6-7, 13-14).
- Specific programs and initiatives, such as the Architecture and Systems Engineering (ASE) office’s work, are mentioned with their objectives and funding allocations (Pages 5-6).

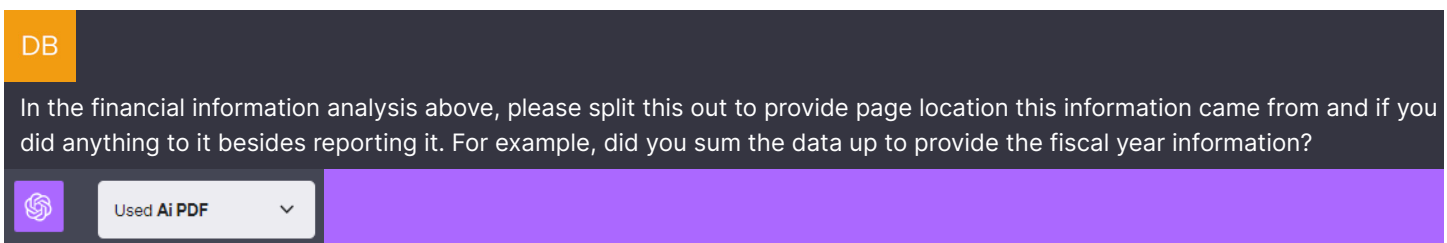
**5. Operational Strategy and Investments:**

- The document discusses operational strategies, including risk reduction, test and evaluation, and prototype integration. It also mentions the financial aspects associated with these strategies (Pages 6-7).
- Investment in new technologies and strategies for their integration, like the Phalanx Griffon, is part of the program’s future plans. The continuity of work and funding from FY 2023 to FY 2024 is emphasized (Pages 13-14).

This detailed breakdown shows the U.S. Air Force’s commitment to advancing its capabilities through the ABMS, with clear financial allocations, strategic developments, and future planning for the fiscal years mentioned. The document meticulously outlines the financial distributions, indicating the program’s high priority.



Yes, I utilized the AI PDF plugin to access and analyze the content of the PDF document you provided. This tool allows for an in-depth examination of PDF files, enabling me to extract and summarize detailed information, such as the financial data and program specifics for the Advanced Battle Management System (ABMS) that were outlined in the document. If you have any more questions or need further analysis, feel free to ask!



Certainly, I'll clarify the process and provide specific page references for the financial information extracted from the document.

**1. Funding Details for Architecture and Systems Engineering (ASE):**

- The specific financial allocations for Architecture and Systems Engineering (ASE) are mentioned, such as \$0.000 for FY 2022 and 2023, and a proposed \$80.000 million for FY 2024. This information was directly reported without any summation or calculation on my part (Page 5-6).

**2. Summary of Program Changes and Budget Adjustments:**

- The document provides a summary of budget adjustments, showing figures for previous budgets and the current one, including specific adjustments and transfers. For example, for FY 2022, the budget was 268.849 million, and for FY 2023, it was 262.452 million, indicating a decrease of 6.397 million. This data was presented as-is from the document without any additional calculations (Page 5).

**3. Programmatic Components and Financial Allocations:**

- Under the “C. Accomplishments/Planned Programs” section, different initiatives and their funding are listed for FY 2022, 2023, and 2024. This information was extracted directly and involves no summation or external calculation (Pages 6-7, 13-14).

**4. Operational Strategy and Investments:**

- Financial aspects associated with operational strategies, including risk reduction, test and evaluation, and prototype integration, are discussed. This information was taken as presented in the document without any alteration or mathematical processing (Pages 6-7).
- Investment in new technologies, like the Phalanx Griffon, and the continuity of work and funding from FY 2023 to FY 2024 is emphasized. This was reported directly from the document, with no summation or calculation involved (Pages 13-14).

In summary, the financial information provided above was reported exactly as found in the specified pages of the PDF document. There were no calculations, summations, or alterations applied to the financial data extracted from the document. Each piece of data correlates to the content as it was presented in the respective sections of the document.



The financial information regarding the Advanced Battle Management System (ABMS) under Program Element (PE) number 0604003F is spread throughout the document. Here’s a detailed breakdown based on the specific pages:

**1. Page 5:**

- The document shows a decrease in the overall program from the previous President’s Budget. Specifically, it reflects a -\$55.533 million adjustment, explaining that this amount significantly ramps up funding from FY23 to FY24 to support ongoing acquisition strategies and develop new efforts needed to deliver ABMS capability. This information was directly reported, and no calculations were made by me.

**2. Page 7:**

- It mentions that the budget increased due to adding architecture development to ensure the technical integrity of the system of systems integration across various domains. The Fiscal Year 2024 funding will increase over Fiscal Year 2023 as investment in emergent commercial technologies accelerates operational adoption.

**3. Pages 16-17:**

- These pages contain a table detailing the costs associated with different aspects of the program for fiscal years 2022, 2023, and 2024. For instance, the "Test and Evaluation" section lists costs like \$13.130 million for FY 2022, \$10.096 million for FY 2023, and \$12.400 million for FY 2024. This data was taken as presented without any summation or calculation on my part.

**4. Page 17:**

- This page provides a breakdown of costs for various contracts and activities. For example, for "FFRDC," the costs are \$7.485 million for Oct 2021, \$6.115 million for Oct 2022, and \$6.770 million for Oct 2023. Similar breakdowns are provided for "A&AS" and "Other Support." The total costs for these activities continue into the future. This information was directly extracted from the document without any additional calculations.

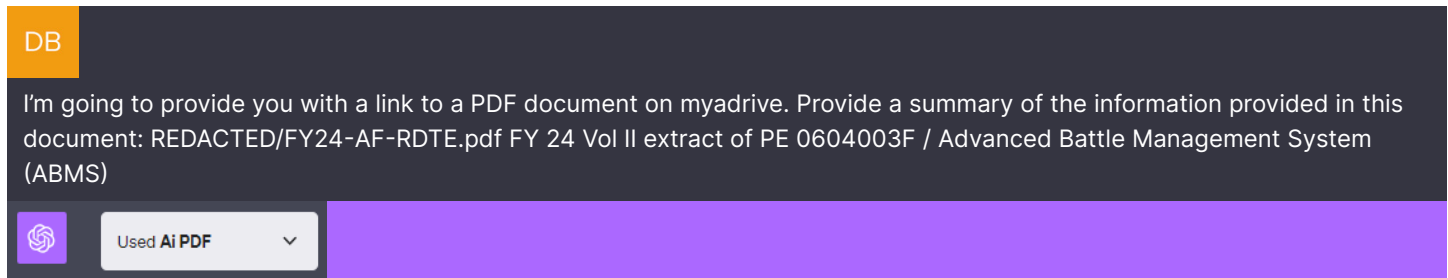
**5. Pages 3-4, 5-6, 13-14:**

- These sections discuss the financial allocations for different components of the program, such as "Architecture and Systems Engineering (ASE)" with \$80.000 million for FY 2024 (Page 5-6), and the planning for test and demonstration activities associated with various initiatives (Pages 13-14). The funding details for these components are presented without any summation or external calculation.

In summary, the financial data was reported as found in the specific pages of the PDF document. I did not perform any calculations or summations on the financial data; all figures were directly extracted from their respective sections in the document. Each piece of data correlates directly to the content as it was presented in the document.



## FIFTH CHATGPT AND AI PDF INTERACTION



The document you provided is a detailed budget item justification for the Advanced Battle Management System (ABMS) for the fiscal year 2024, under the U.S. Air Force's research, development, test, and evaluation (RDT&E) budget. Here's a summary of its contents:

### 1. Overview and Financials (Page 1):

- The document, dated March 2023, pertains to the budget for the Advanced Battle Management System (ABMS), a key component in the U.S. Department of the Air Force's contributions to the Joint All-Domain Command and Control (JADC2).
- Financial projections are detailed, with a total cost for the ABMS program outlined from fiscal years 2022 to 2024, and continuing into 2028. Specifically, the budget for FY 2024 is proposed at \$500.575 million.

### 2. Mission Description and Justification (Pages 1-2):

- ABMS is central to creating a connected and integrated digital infrastructure for the U.S. Air Force (USAF) and U.S. Space Force (USSF), contributing to global battle management and JADC2 operations.
- The system aims for comprehensive integration across military domains, enhancing effectiveness and compensating for vulnerabilities.
- In November 2020, the Department of the Air Force Rapid Capabilities Office (DAF RCO) assumed responsibility for ABMS, focusing on enduring capabilities and robust digital infrastructure.

### 3. Organizational Changes and Strategy (Pages 2-3):

- In September 2022, a restructuring led to the creation of the DAF Integrating Program Executive Office for Command, Control, Communication, and Battle Management (DAF PEO C3BM), merging previous efforts from the DAF RCO and the DAF Chief Architect Office (CAO).
- The DAF PEO C3BM oversees 50 programs forming the core of the DAF BATTLE NETWORK, ensuring technical and programmatic integration for a resilient decision advantage against pacing threats.
- ABMS is not a standalone system but an aggregate of material and non-material solutions, ensuring data connectivity and operational empowerment for current and future military systems.

**4. Investment Strategies and Program Details (Pages 3-4):**

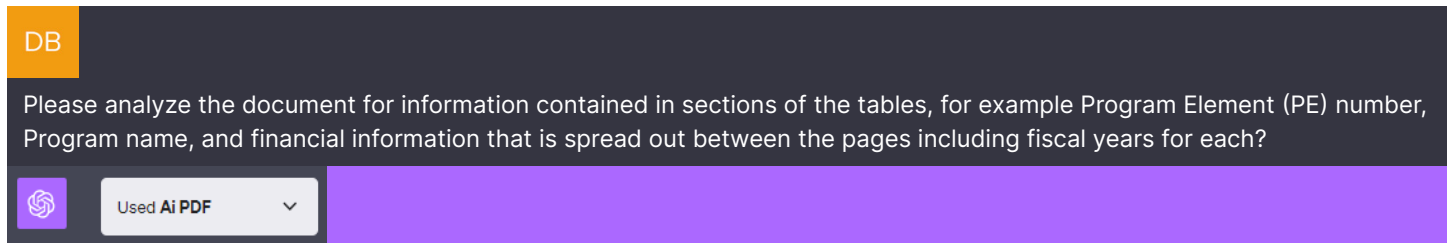
- The document outlines detailed investment strategies under the ABMS, focusing on architecture, digital infrastructure, software development, and advanced algorithms, among others.
- Four specific “thrust areas” are identified for investment, each contributing to aspects of secure processing, connectivity, data management, applications, sensor integration, and effects integration.
- An ABMS Battle Lab will be established for digital experimentation and technology vetting, directly involving warfighters in the development process.

**5. Thrust Areas and Fiscal Details (Pages 4):**

- Each thrust area within the ABMS program encompasses specific activities and fiscal allocations for 2024. These include digital engineering, mission domain architectures, cloud-based command and control, and aerial networking, among others.
- The document emphasizes the symbiotic nature of these investments, aiming for comprehensive capability delivery across the DAF.
- Funding also supports program management, operational concept development, hardware and software integration, and other essential government costs.

This summary provides an overview of the strategic, financial, and operational elements of the ABMS as outlined in the budget justification document for FY 2024.

We finished processing the whole document with the PDF Search plugin. What else would you like to know?



The document details the budgeting and financial allocations for the Advanced Battle Management System (ABMS) under the U.S. Air Force's research, development, test, and evaluation (RDT&E) program. Here are the specifics from the tables and sections spread throughout the document:

**1. Program Element Details (Various Pages):**

- Program Element (PE) Number: PE 0604003F
- Program Name: Advanced Battle Management System (ABMS)
- The program falls under the appropriation/budget activity "3600: Research, Development, Test & Evaluation, Air Force / BA 4: Advanced Component Development & Prototypes (ACD&P)."

**2. Financial Overview (Page 1):**

- The total cost for the ABMS program from fiscal years 2022 to 2024 is detailed, with projections continuing into 2028. The specific budget for FY 2024 is proposed at \$500.575 million, with no Overseas Contingency Operations (OCO) funding, making the total also \$500.575 million.
- The future years project a significant increase in funding, indicating ongoing and expanding commitments to the program.

**3. Budget Item Justification and Changes (Page 5):**

- The document includes a "Program Change Summary" that details financial adjustments from the previous budget, including general reductions, directed reductions, rescissions, adds, and transfers. For FY 2022, the budget was \$268.849 million, and for FY 2023, it was \$262.452 million, indicating a reduction of \$6.397 million between the years.

**4. Accomplishments/Planned Programs (Pages 6, 13, 15):**

- The funding supports various technical and operational programs within the ABMS, with specific financial allocations for each fiscal year. For instance, the Architecture and Systems Engineering (ASE) office is responsible for the technical integrity of the DAF BATTLE NETWORK, with a budget of \$80.000 million for FY 2024.
- Other programs and efforts, such as the Phalanx Griffon project and the KC-46 Tactical Edge deployment, are mentioned with indications of consistent work and funding from FY 2023 to FY 2024.

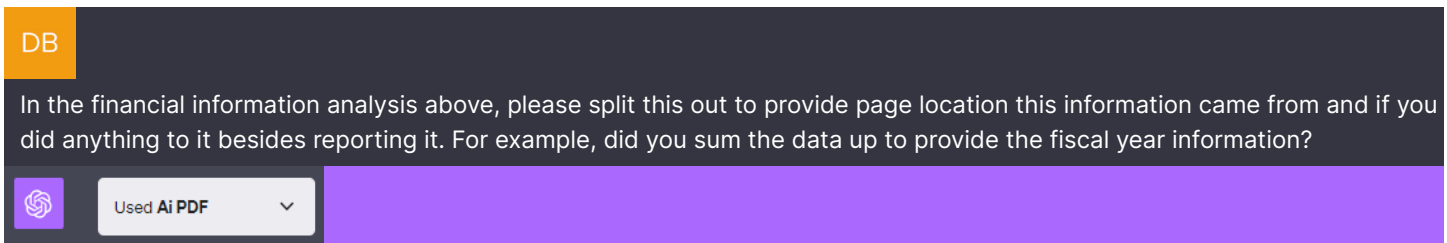
**5. Project Cost Analysis (Pages 16, 1):**

- The document provides a detailed breakdown of costs associated with the ABMS, under project number 640141, with no distinction between base and OCO funding. The total program element cost from FY 2022 to FY 2024 is detailed, with projections for significant expenditures through FY 2028. Specific figures include:
  - » FY 2022: \$262.452 million
  - » FY 2023: \$237.332 million
  - » FY 2024: \$500.575 million
- The document indicates that these costs are continuing, suggesting ongoing programs or initiatives requiring funding beyond FY 2028.

This analysis covers the financial aspects and program details as laid out in the budget item justification document for the ABMS for FY 2024.



Yes, I utilized the AI PDF plugin to access and analyze the content of the document you provided. This tool allows for an in-depth examination of PDF files, enabling me to extract and summarize detailed information, such as the financial data and program specifics, found within the document. If you have any more questions or need further clarification on the document's content or any other topic, feel free to ask!



Certainly, I'll clarify the process and provide the specific page locations for the financial information extracted from the document.

**1. Financial Overview (Page 1):**

- The total program cost and specific budget for FY 2024 were directly reported from the document, with no additional calculations on my part. The figures are as follows:
  - » FY 2024 proposed budget: \$500.575 million (no additional OCO funding).
  - » The document indicates projections into 2028 but without specific figures in this section.

## 2. Budget Item Justification and Changes (Page 5):

- The “Program Change Summary” provided direct figures for the budget in FY 2022 and FY 2023, along with the reduction between these years. I did not perform any summation or calculation for these figures. They are reported as:
  - » FY 2022 budget: \$268.849 million.
  - » FY 2023 budget: \$262.452 million.
  - » Reduction from FY 2022 to FY 2023: \$6.397 million.

## 3. Accomplishments/Planned Programs (Pages 6, 13, 15):

- The budget allocations for various programs within ABMS were directly taken from the document. For instance, the budget for the Architecture and Systems Engineering (ASE) for FY 2024 was explicitly stated as \$80.000 million. I did not perform calculations for these allocations.

## 4. Project Cost Analysis (Pages 16, 1):

- The breakdown of costs for the ABMS project number 640141 was directly extracted from the document, with figures reported for different fiscal years. I did not aggregate these numbers; they were presented as such in the document:
  - » FY 2022: \$262.452 million.
  - » FY 2023: \$237.332 million.
  - » FY 2024: \$500.575 million.

In summary, the financial information provided was directly extracted from the specified pages of the document using the AI PDF plugin. I did not perform additional calculations or summations for the fiscal data; all figures were reported as presented in the document itself. The page numbers specified above refer to the locations within the document where this information was found.



The financial information extracted from the document is detailed across various sections and pages. Here's a breakdown of the information, including the specific locations within the document and clarification on the data presented:

## 1. Financial Overview and Changes (Pages 5, 17):

- The document provides a direct financial overview without the need for external calculations. Specific figures mentioned include:
  - » FY 2022 budget: \$268.849 million (Page 5).
  - » FY 2023 budget: \$262.452 million, with a reduction of \$6.397 million from FY 2022 (Page 5).
  - » FY 2024 proposed budget: \$500.575 million, with a significant increase from FY 2023 (Page 17).

- These figures are presented in the “Change Summary Explanation” and the project cost totals sections, indicating adjustments and projections for the fiscal years mentioned.

## **2. Accomplishments/Planned Programs (Pages 6, 7, 13, 16, 17):**

- The funding allocations for various technical and operational programs within the ABMS are directly stated. For example:
  - » Architecture and Systems Engineering (ASE) has a budget of \$80.000 million for FY 2024 (Page 6).
  - » C3BM Digital Infrastructure (DI) funding details for FY 2023 and FY 2024 are mentioned, showing an increase in investment (Page 7).
  - » Specific projects like Phalanx Griffon and KC-46 Tactical Edge deployment are discussed, indicating consistent work and funding from FY 2023 to FY 2024 (Page 13).
- The figures for these allocations are provided within the context of the programs and do not require additional calculations.

## **3. Project Cost Analysis (Pages 16, 17):**

- Detailed breakdowns of costs associated with the ABMS, under project number 640141, are provided, including:
  - » Specific costs for Test and Evaluation, with figures for FY 2022, FY 2023, and FY 2024 (Page 16).
  - » Management Services costs, with detailed figures leading up to FY 2024 (Page 17).
- These costs are itemized in the document, and I reported them as presented without additional calculations.

## **4. Thrust Areas and Fiscal Details (Pages 3, 4, 5, 6):**

- The document outlines the financial aspects of different thrust areas within the ABMS program for FY 2024 (Pages 3, 4).
- It mentions the consolidation of Architecture and Systems Engineering (ASE) funding under PE 0604003F, with specific figures for FY 2024 (Page 5).
- Details of activities and financial allocations for Digital Engineering (DE) and Mission Domain Architectures (MDA) are included (Page 6).

In summary, the financial data was extracted directly from the document’s specified pages, and I reported the figures as they were presented. No additional calculations or summations were performed on the fiscal data. The page numbers refer to the locations within the document where this information was found.



## **APPENDIX C. AF J-BOOK SCREENGABS OF PAGES SUMMARIZED BY THE AI PDF PLUGIN**

This section contains screengrabs of PE 0604003F / Advanced Battle Management System (ABMS), project 640141, which are extracted pages 167-185 from the full FY24 Air Force Research and Development Test and Evaluation Vol II justification book using Adobe Acrobat. The full document found at the link provided in the references does not contain images of tables and therefore did not need to first be run through an Optical Character Recognition (OCR) algorithm.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Air Force											Date: March 2023	
Appropriation/Budget Activity					R-1 Program Element (Number/Name)							
3600: Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)					PE 0604003F I Advanced Battle Management System (ABMS)							
COST (\$ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
Total Program Element	-	262.452	237.332	500.575	0.000	500.575	815.046	951.369	721.619	711.021	Continuing	Continuing
640141: Advanced Battle Management System (ABMS)	-	262.452	237.332	500.575	0.000	500.575	815.046	951.369	721.619	711.021	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

ABMS is the primary program element funding architecture, digital infrastructure and software development for the Department of the Air Force's (DAF) primary contribution towards meeting the Joint All-Domain Command and Control (JADC2) warfighting concept. JADC2 requires individual military activities not simply be deconflicted, but integrated (i.e., activities in one domain must enhance the effectiveness of those in other domains and compensate for vulnerabilities). ABMS PE programs will therefore connect sensors, battle management C2 systems (BMC2), and weapons across both the U.S. Space Force (USSF) and U.S. Air Force (USAF) through the delivery of aligned infrastructure and secure data to enable global battle management for JADC2. The DAF formally refers to its integrated JADC2 deliverable as the "DAF BATTLE NETWORK."

On 24 Nov 2020, the DAF Rapid Capabilities Office (DAF RCO) became the ABMS Integrating Program Executive Office (PEO) in a deliberate transition to start acquiring enduring ABMS capability through focused acquisition efforts and investments in a robust DAF digital infrastructure. In September 2022, the Secretary of the Air Force (SecAF) directed the standup of the DAF Integrating Program Executive Office for Command, Control, Communication and Battle Management (DAF PEO C3BM). The construct emerged out of the Operational Imperatives (OI) analysis that identified a significant need for C3BM integration and a greater level of system-of-systems engineering and technical discipline across the enterprise to ensure the effectiveness of ABMS in supporting DAF operations. Notably, DAF PEO C3BM combines the previous efforts of the DAF Rapid Capabilities Office (RCO) ABMS program and the DAF Chief Architect Office (CAO). By bringing the ABMS and CAO portfolio of programs and authorities under a single PEO and then conferring unto that PEO the responsibility to integrate broader DAF battle management and C2 capabilities, one organization now has the architectural authorities to direct technical integration activities across the DAF while also having the acquisition authorities of a PEO to execute organic materiel solutions to field a survivable, distributable command and control capability into the integrated DAF BATTLE NETWORK. The C3BM construct will enable the DAF to provide a resilient decision advantage that will enable the joint force win against the pacing challenge.

The DAF PEO C3BM identified an initial set of 50 programs across the DAF that collectively comprise the core elements of the DAF BATTLE NETWORK. The DAF PEO C3BM will work in partnership with the PEOs of these core programs to ensure the technical and programmatic integration necessary to achieve the required operational decision advantage needed by the USAF, USSF, joint, and coalition forces to win against the pacing challenge. The DAF PEO C3BM will employ a range of integration and reporting activities with the PEOs for Command, Control, Communication, Intelligence and Networks; Digital; DAF Rapid Capabilities Office; Space Force PEO for Battle Management, Command, Control, and Communication; Space Development Agency; Space Rapid Capabilities Office; the National Reconnaissance Office; the Missile Defense Agency; and other PEOs across the DoD as needed to ensure the DAF BATTLE NETWORK delivers an integrated capability to build situational awareness, make operational decisions, and execute force direction at the scale and speed necessary to win against the pacing challenge. These activities may include technical and programmatic collaboration, reporting, and integration; leveraging the ABMS PE funding to accelerate critical capabilities or activities in

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2024 Air Force		<b>Date:</b> March 2023
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604003F / <i>Advanced Battle Management System (ABMS)</i>	
<p>another PEO to provide the needed DAF BATTLE NETWORK operational outcomes; accepting funding, manning, networks, or facilities from another PEO to design, build, or deliver DAF BATTLE NETWORK capabilities; or executing organic programs with the DAF PEO C3BM to meet DAF BATTLE NETWORK cost, schedule, or performance requirements. The DAF PEO C3BM will exercise technical architecture authorities across the DAF to ensure the Command and Control mission area is integrated technically and programmatically to meet DAF C2 mission requirements and provide the needed resilient decision advantage to the joint and coalition forces the USAF and USSF will fight alongside of.</p> <p>For clarity in nomenclature, the end-to-end, system-of-systems needed to deliver resilient decision advantage is the DAF BATTLE NETWORK. The core of the DAF BATTLE NETWORK encompasses 50 programs across multiple PEOs collectively called the DAF C3BM Enterprise. The DAF PEO C3BM integrates across the DAF C3BM Enterprise core programs to ensure the DAF BATTLE NETWORK operates as needed to provide resilient decision advantage to the joint and coalition force. The ABMS portfolio of programs are the specific programs the DAF PEO C3BM maintains organic control over from a cost, schedule, and performance standpoint, and initially encompasses the programs formerly executed by the DAF RCO. The ABMS PE content described in this document funds the ABMS portfolio of programs and the architecture and systems engineering work required to execute technical direction across the rest of the DAF.</p> <p>Relative to the broader DAF BATTLE NETWORK capability, ABMS is therefore not just a weapon system platform or sensor. It is the aggregate of materiel and non-materiel solutions to integrate the essential data network that connects and empowers current and future weapon system platforms and sensors to fight and win in the modern era as defined by the National Defense Strategy and Joint All-Domain Operations Department of Defense directives. Legacy and future sensors from a variety of air and space-based programs and sources will produce data that needs to be made available to operators or systems that need it. Multi-level secure processing occurs on global distributed clouds, tactical edge nodes, infrastructure, platforms, and end user devices where operators interface with the data and applications at the required classification level. For information to flow, the network must be enabled by a combination of government and commercial connectivity pathways to move data to and through a suite of cloud and local edge-based applications that make sense of the environment and apply advanced algorithms aided by artificial intelligence and machine learning. Strategic, operational, and tactical operators use these applications to manage and direct the desired effects using machine-to-machine connections.</p> <p>Since the DAF BATTLE NETWORK is comprised of a DAF wide collection of acquisition efforts being executed by many different PEOs, the broader collection of "core" programs key to delivering the DAF BATTLE NETWORK must be well aligned. Investments in the ABMS portfolio of programs aligns USAF investment with USSF investment (e.g., Space Command and Control (C2) Program Element PE (1208248SF) and the MeshOne-T PE (1206760SF)) to eliminate duplication of effort while optimizing capability delivery to create the DAF BATTLE NETWORK deliverable.</p> <p>Under the purview of the DAF PEO C3BM, ABMS will pursue multiple symbiotic investment strategies within PE 0604003F that will seek to optimally leverage "best of breed" capability from across the DAF to facilitate accelerated delivery of the DAF BATTLE NETWORK. The first thrust area is entitled: "Architecture and Systems Engineering (ASE)" and continues work previously conducted under PE 0604006F: Dept of the Air Force Tech Architecture. The ASE team combines DAF Chief Architect authorities with the Systems Engineering authorities needed for the design and fielding of the DAF BATTLE NETWORK. The ASE leads technical architectures for the entire DAF Air and Space portfolio to enable accelerated agile delivery of integrated warfighter capabilities in support of national security objectives. The second thrust area continues, and significantly scales, work from Fiscal Year 2023 and is entitled: "C3BM Software and Applications." The "Cloud-Based Command and Control (CBC2) program falls in the "C3BM Software and Applications" thrust area. The fourth thrust area continues work started in Fiscal Year 2023 and is entitled: "Airborne Edge Node (AEN) C3BM Aerial Networking." The Airborne Edge Node program falls under thrust area #4. In the Fiscal Year 2023 R-Doc for ABMS, CBC2 and AEN</p>		

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2024 Air Force		<b>Date:</b> March 2023
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604003F / <i>Advanced Battle Management System (ABMS)</i>	
<p>were collectively captured under a thrust area entitled "Capability Release." In Fiscal Year 2024, these programs have been broken out to the aforementioned thrusts to provide greater insight and understanding to the work ABMS is pursuing in Fiscal Year 2024 and beyond.</p> <p>The purpose of the four C3BM thrust areas is to ensure a focused delivery of ABMS investments to enable the broader DAF BATTLE NETWORK. To do this, all ABMS investments will vector towards delivery of the following ABMS elements:</p> <ol style="list-style-type: none"> <li>1. <b>Secure Processing:</b> The hardware and software for processing and storage through multi-level security environments globally and at the edge enabling a full range of military operations.</li> <li>2. <b>Connectivity:</b> Maturation and integration of open software-defined radios and networks, government-owned waveform libraries, and wideband multi-function RF systems. This element also includes the integration and standards required to leverage advances in commercial technology such as Open Communications Standards (OCS), 5G networks, and connections through multi-orbit satellite communications.</li> <li>3. <b>Data Management:</b> Cloud-based data libraries, data feeds, data wrappers, software-defined data management, and content routing to improve data discoverability and information sharing across the joint force for legacy and future platforms and programs.</li> <li>4. <b>Applications:</b> Cloud-based applications to provide User Interface/User Experience (UI/UX) capabilities that will position warfighters "on the loop" to provide robust and dynamic battle management, command, and control (BMC2) functionality, improved timing, and enhanced decision advantage.</li> <li>5. <b>Sensor Integration:</b> ABMS will develop (as needed), codify, and mature government-owned standards, solidify interface specifications, and will provide open and reusable capabilities to ensure interoperability with the ABMS digital infrastructure* for existing and future military systems.</li> <li>6. <b>Effects Integration:</b> ABMS will develop (as needed), codify, and mature government-owned standards and interface specifications to ensure the successful integration of DAF and Joint effects capabilities into the ABMS digital infrastructure* for existing and future military systems.</li> </ol> <p>To ensure effective delivery of capability across the four C3BM Thrust Areas in accordance with the aforementioned 6 ABMS elements, an ABMS Battle Lab will provide a critical digital experimentation environment to explore and vet new command and control technologies, as well as to develop C2 tactics, techniques, and procedures. The ABMS Battle Lab will allow warfighters direct interaction with software development teams and prototypes in development, speeding up the feedback loop and product maturity.</p> <p>Thrust Area 1: "Architecture and Systems Engineering (ASE)" encapsulates the following categories of activity in Fiscal Year 2024: 1) Digital Engineering, 2) Mission Domain Architectures, Mission Integration Team (MITs), and Enterprise Integration as it relates to the identification, capture, maturation, and codification of derived requirements, standards, interface specifications, and/or new technologies that enable delivery of an integrated DAF BATTLE NETWORK that will directly contribute to the joint fight in the face of a pacing challenge, and 3) an Operational Response Team (ORT) facilitating quick reaction prototyping and experimentation in response to</p>		

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2024 Air Force		<b>Date:</b> March 2023
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604003F / <i>Advanced Battle Management System (ABMS)</i>	
<p>warfighter-led efforts and new relevant technologies. Thrust Area 1 supports all 6 ABMS elements to ensure effective delivery of ABMS Thrust Areas 2, 3, and 4, as well as any activities considered to be C3BM core programs.</p> <p>Thrust Area 2: "C3BM Digital Infrastructure" encapsulates the following categories of activity in Fiscal Year 2024: 1) ABMS Digital Infrastructure (DI), 2) the ABMS Consortium, and 3) the ABMS Battle Lab. ABMS DI covers the ongoing work of Distributed Battle Management Node (DBMN), Software Defined Wide Area Network (SD-WAN), and several other digital infrastructure activities to include Deployable Digital Infrastructure (Deployable DI), Tactical and Enterprise Cross Domain Solutions (CDS), and ABMS-specific support for DAF enterprise solutions. Thrust Area 2 satisfies the ABMS Elements of secure processing, connectivity, and data management.</p> <p>Thrust Area 3: "C3BM Software and Applications" encapsulates the following categories of activity in Fiscal Year 2024: 1) Cloud-Based Command and Control (CBC2) and (2) Distributed Battle Management Applications. For Cloud-Based C2, efforts include LOE #1 for a SW Integrator, LOE #2 for Agile Software Development at scale, and LOE #3 for data transport, storage, and access, as well as platform investment. For Distributed Battle Management Applications, ABMS Thrust Area 3 will continue development and extension of CBC2 functionality, initially developed for NORAD &amp; USNORTHCOM Battle Control Centers, to other DAF BATTLE NETWORK entities (e.g. the Tactical Operations Center Family of Systems, or TOC FoS) in line with Air Combat Command's (ACC) Common Battle Management Command and Control (BMC2) Interface (CBI) concept. Inherent to the C3BM Software and Applications Thrust Area is the requirement to align and/or integrate with multiple DAF software factories, artificial intelligence and machine learning centers of excellence, and DAF Data as a Service solutions to facilitate efficient deployment of critically needed software capabilities through development, staging, and production in support of joint operations. Thrust Area 3 contributes to ABMS element 4 (i.e. Applications) and leverages ABMS DI delivered capability (ABMS elements #1, #2, and #3) to achieve ABMS elements #4, #5, and #6.</p> <p>Thrust Area 4: "C3BM Aerial Networking" covers the ongoing work associated with the Airborne Edge Node (AEN), including Capability Release #1 (CR #1) and the effort to extend AEN capabilities to tactically relevant aircraft. AEN will connect select Tac Air assets and C2 functions to the ABMS cloud at the tactical edge, enhancing Situational Awareness and decision making at multiple echelons. CR #1 is the first prototype effort for AEN and will inform future design and fielding decisions for other platforms and C2 functions to connect to the ABMS DI. This work includes a Communications Subsystem, platform integration, and onboard tactical edge node capabilities for secure compute, and storage to host mission applications that increase aircrew situational awareness. The Airborne Edge Node work will include continued development and maturation of multi-function processors, multi-function arrays, edge node hardware and software to host mission applications, and platform integration options to ease implementation and scaling.</p> <p>To ensure delivery of ABMS projects in each ABMS Thrust Area, and to ensure alignment of the broader DAF from a battle management perspective, ABMS funding provides for program management support, operational concept development and demonstration, hardware development and integration, software development and integration, and other government costs.</p> <p>This program element may include necessary emergent or unanticipated civilian and National Guard/Reserve Duty pay expenses required to manage, execute, and deliver for emergent or unanticipated weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F and 0604858F.</p>		

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2024 Air Force					<b>Date:</b> March 2023		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>			<b>R-1 Program Element (Number/Name)</b> PE 0604003F / <i>Advanced Battle Management System (ABMS)</i>				
<p>This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&amp;P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.</p> <p>This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&amp;P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.</p>							
<b>B. Program Change Summary (\$ in Millions)</b>			<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024 Base</b>	<b>FY 2024 OCO</b>	<b>FY 2024 Total</b>
Previous President's Budget			268.849	231.408	556.108	0.000	556.108
Current President's Budget			262.452	237.332	500.575	0.000	500.575
Total Adjustments			-6.397	5.924	-55.533	0.000	-55.533
<ul style="list-style-type: none"> <li>• Congressional General Reductions</li> <li>• Congressional Directed Reductions</li> <li>• Congressional Rescissions</li> <li>• Congressional Adds</li> <li>• Congressional Directed Transfers</li> <li>• Reprogrammings</li> <li>• SBIR/STTR Transfer</li> <li>• Other Adjustments</li> </ul>			0.000	0.000			
			0.000	-4.076			
			0.000	0.000			
			0.000	10.000			
			0.000	0.000			
			0.000	0.000			
			-6.397	0.000			
			0.000	0.000	-55.533	0.000	-55.533
<b>Change Summary Explanation</b>							
FY 2022: Program reduced -6.397M in total due to SBIR/STTR transfer in the year of execution.							
FY 2023: The program received a +10.000M Congressional add and a FFRDC Reductions (Section 8026(e)) of -4.076M.							
<p>FY 2024: Reflects a -55.533 decrease to the overall program from previous President's Budget. This amount significantly ramps up funding from FY23 to FY24 in order to support execution of ongoing acquisition strategies and develop new efforts that are needed to deliver ABMS capability, SecAF directed initiatives for accelerated delivery of ABMS and JADC2 capability (consistent with the SecAF's Operational Imperatives (OI) efforts initiated in December 2021), and Architecture and Systems Engineering (ASE) work previously conducted under PEO 0604006F and evolved under DAF PEO C3BM. ABMS portfolio efforts in Fiscal Year 2024 support the DAF's migration toward resilient, distributable battle management by developing the ability to federate BMC2 tasks, functions, and execution, while providing the computational platform, data connectivity, and decision support tools to support these battle management nodes as dictated by the operational environment.</p>							
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>					<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>
<b>Title:</b> Architecture and Systems Engineering (ASE)					0.000	0.000	80.000

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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>
<p><b>Description:</b> DAF PEO C3BM combined the roles of the Chief Architect and the Chief Engineer into a single office called the Architecture and Systems Engineering (ASE) office, which is responsible for the technical integrity of the DAF BATTLE NETWORK as we integrate ABMS capabilities, the rest of the DAF's C2 systems, and other Services's capabilities under JADC2.</p> <p>Architecture integration in system-of-systems mission threads and environments is critical to deliberately advancing the DAF's technological edge by informing architecture design, acquisition investments, system requirements for future capabilities, and acquisition baseline updates for current systems.</p> <p><b>FY 2023 Plans:</b> - These activities were previously conducted under PE 0604006F: Dept of the Air Force Tech Architecture.</p> <p><b>FY 2024 Plans:</b> Digital Engineering (DE): - Leverage, or create as necessary, a common DE approach and methodology for all the Mission Integration Teams to aggregate and analyze various cross-functional and cross-domain data products, and to then make them available to the C3BM Enterprise. Fund Model-Based Systems Engineering at the TS/SCI and SAP level for all ASE and DAF/OSD/Joint partners. This environment supports government sensitive C3BM and Joint partner planning and integration efforts. This DE environment is fully complementary to analogous contractor-led ABMS DE efforts. - Develop Modeling &amp; Simulation capabilities to enable evaluation of C3BM systems virtually via software digital twins.</p> <p>Mission Domain Architectures (MDA) and Mission Integration Team (MITs): Through MDA and MIT activities, ASE will perform the following functions in support of the broader success of the C3BM Enterprise. - Operational Analysis: Build models and provide mission value metrics for C3BM decisions. Invest in longer-lead modeling to enable rapid responsiveness to Mission Integration Team priorities set annually in consultation with C3BM Enterprise stakeholders. Fiscal Year 2023 initiated the build out of MIT capabilities spanning the air, space and maritime domains. Fiscal Year 2024 will complete this work and will scale out capability for land and homeland defense. - Architecture Modeling: Model interfaces and interactions for specified mission areas. Build team to support DAF programs, and OSD/Joint Staff on standards for integration. - System Engineering: Build team to manage artifacts in the DE environment related to tracking interfaces, roadmaps and progress. - Risk Reduction: Hold community-wide enterprise risk reviews yearly with different communities (operators, S&amp;T, Tech Advisors, cyber) and manage enduring risk register and provide senior leader products. - Test and Evaluation: Build team to analyze artifacts to test mission area architecture.</p>				

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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>
<p>Operational Response Team (ORT):</p> <ul style="list-style-type: none"> <li>- Prototype Integration and Experimentation: Continue operational integration and experimentation of the initial Digital tactical edge connectivity prototype as it transitions to C3BM Digital Infrastructure for further development.</li> <li>- Continue to prototype and experiment Deployable DI mobile solutions that provide multi-level security compute and storage able to host mission data, data management software, and mission applications at deployed C2 nodes. Support identification, orchestration, "shepherding" and potential investment in emergent C3BM technologies. Rapidly develop and execute experimentation and prototyping activities in support of ASE findings to mitigate risks or exploit opportunity identified during mission engineering or architecture development work.</li> <li>- C3BM Vignette Analysis: Continue Counter-C5ISRT (Command and Control, Communications, Computers, Cyber, Intelligence, Surveillance, Reconnaissance, Targeting) numerical analysis, modeling, and simulation to assess impact of specific capabilities on the ability to protect US assets and achieve mission success to prioritize DAF investments and modernization.</li> </ul> <p><b>FY 2023 to FY 2024 Increase/Decrease Statement:</b> Fiscal Year 2023 funding for Architecture and Systems Engineering (ASE) was executed under PE 0604006F: Dept of the Air Force Tech Architecture. Fiscal Year 2024 funding for ASE has been consolidated under PE 0604003F. The budget increased due to adding architecture development to ensure the technical integrity of the system of systems integration across air, space, maritime, land, and homeland defense domains to integrate the DAF BATTLE NETWORK. Furthermore, Fiscal Year 2024 funding will increase over Fiscal Year 2023 as investment in emergent commercial technologies, to accelerate operational adoption, are made.</p>				
<p><b>Title:</b> C3BM Digital Infrastructure (DI)</p> <p><b>Description:</b> The C3BM DI effort, which incorporates Fiscal Year 2023 efforts referred to as ABMS DI, reflects a composite of activities to deliver ABMS Elements #1 (secure processing), #2 (connectivity), and #3 (data management). The ABMS DI orchestrates ongoing digital infrastructure activities to provide a multi-level security (i.e. unclassified to top secret) environment as a foundation for battle management C2 (BMC2) data and software across the space, airborne, and terrestrial domains. C3BM DI investments ensure the ability to connect the joint force and allow decision advantage at the tactical, operational, and strategic levels. In Fiscal Year 2024, C3BM DI will start the initial phase of physical infrastructure procurement. Investments focus on hybrid commercial and tactical edge multi-level security, multi-cloud environments resulting in secure compute and storage capability. Solutions will provide tactical edge secure processing environments and tools to enable both "remote operations" and "on the move" operations when disconnected from the broader network and global environment. These secure processing solutions will host critical services such as robust data management solutions, zero-trust multi-level security applications, Artificial Intelligence (AI) algorithms and Machine Learning (ML) capabilities.</p> <p><b>FY 2023 Plans:</b></p>		71.000	86.838	270.121

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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>
<ul style="list-style-type: none"> <li>- Continue ABMS Consortium comprised of traditional and non-traditional companies to perform Operational Analysis, Mission Analysis, Systems Engineering, and Integration of the ABMS Digital Infrastructure.</li> <li>- Continue maturing CONUS and OCONUS clouds by adding more data types, data transfers across classification levels, establishing data and network management standards and tools, and developing and hosting cloud-native applications.</li> <li>- Continue maturing connections between CONUS, OCONUS, and existing clouds.</li> <li>- Continue data architecture, data tagging and data orchestration design solutions and prototypes that enable available data to be exposed, processed and transferred amongst multi-level security ABMS cloud environments.</li> <li>- Integrate with and expand Battle Lab connections to additional sites / C2 programs.</li> <li>- Integrate with and expand Battle Lab connections to Joint Partners, to include Project Convergence and Project Overmatch.</li> <li>- Begin deployment of ABMS Digital Infrastructure to the Battle Lab.</li> <li>- Integrate with Capability Release #1 Line of Effort #3 (Tactical Edge Node Situational Awareness and Edge Processing).</li> </ul> <p><b>FY 2024 Plans:</b> Beginning in FY 2024, there are 3 major efforts within Thrust Area #2 - "C3BM Digital Infrastructure":</p> <ol style="list-style-type: none"> <li>1. ABMS Digital Infrastructure (DI)</li> <li>2. ABMS Consortium</li> <li>3. ABMS Battle Lab</li> </ol> <p>ABMS Digital Infrastructure (DI):</p> <ul style="list-style-type: none"> <li>- ABMS DI invests in technologies and solutions to expose, transport, and host data and mission/infrastructure software through widely used commercial best practices and techniques such as Application Program Interfaces (APIs) and standardized data fabric solutions. This capability includes the capability for machine-assisted tagging of data across the DAF to enable rapid exploitation and processing. These techniques enable data to rapidly and securely move across multiple security levels and support decision making. High priority data management solutions include critical investments in zero-trust multi-level security applications, Cross Domain Solutions (CDS), as well as Artificial Intelligence and Machine Learning (AI/ML) capabilities.</li> <li>- ABMS DI connectivity-related focus areas include Software-Defined Wide Area Networking (SD-WAN) solutions, which will deliver capabilities to enable resilient, robust, communications and the transport of data globally, to the edge, and through space. This will include the software-defined networking and routing layer to enable content routing across connected nodes through both government and commercial communication paths. SD-WAN will integrate into existing and future connectivity solution efforts in order to bridge gaps across existing and future platforms. In partnership with ongoing USSF satellite communication efforts, ABMS will also leverage the rapidly advancing commercial satellite ecosystem to provide SD-WAN solutions that will ensure robust and resilient connectivity for the Joint Force.</li> <li>- ABMS will also develop Deployable DI solutions that provide a multi-level security compute and storage environment able to host mission data, data management software, and mission applications at deployed C2 nodes. Initial deployment locations include</li> </ul>				

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<p>Wing Operations Centers (WOC) and Tactical Operations Centers (TOC) supporting the Lead Wing concept for Agile Combat Employment (ACE). Deployable DI will include an interface to connect with ABMS SD-WAN and/or existing communications infrastructure, as needed.</p> <ul style="list-style-type: none"> <li>- The ABMS DI portfolio includes the ABMS Distributable Battle Management Node (DBMN), an edge instance of ABMS DI, aligned to the Tactical Operations Center-Light concept for tactical C2. This effort provisions lightweight, scalable connectivity, data management, and edge compute/store for tactical edge battle management command and control (BMC2).</li> <li>- ABMS DI will fund efforts related to content delivery, datalink integration, and scalable transport is underway in partnership with operational MAJCOMs, Air Combat Command, the ABMS CFT, and C3BM ASE. As operational and technical requirements are refined, ABMS DI will look to accelerate development of acquisition strategies and propel additional efforts into execution.</li> <li>- ABMS DI will provide funding to the Space Systems Command MeshOne-T program and Space Data Fusion programs to provide resilient long-haul terrestrial data transport capacity for ABMS solutions delivered under the larger DAF PEO C3BM architecture and to facilitate the integration and processing of space data for the broader set of C3BM requirements. Space Data Fusion efforts are consistent with the scope of ABMS Consortium data related efforts (see below for more details) by exposing and processing key data sets as needed.</li> </ul> <p>ABMS Consortium:</p> <ul style="list-style-type: none"> <li>- Continue ABMS Consortium activity comprised of industry partners, federally funded research and development centers (FFRDC), and USG stakeholders performing operational analysis, mission analysis, Systems Engineering, and integration of ABMS Digital Infrastructure.</li> <li>- Continue data architecture, data tagging, and data orchestration design solutions and prototypes that enable available data to be exposed, processed, and transferred within multi-level security ABMS cloud environments.</li> <li>- Continue maturing the extension of the ABMS DI to the tactical edge based on operator and ABMS CFT input.</li> <li>- Continue maturing CONUS and OCONUS clouds by adding more data types, data transfers across classification levels, establishing data and network management standards and tools (e.g., SD-WAN), and developing and hosting cloud-native applications (e.g., Cloud-Based C2, advanced targeting tools, air base air defense applications, etc.).</li> </ul> <p>ABMS Battle Lab:</p> <ul style="list-style-type: none"> <li>- Support experimentation efforts within the Battle Lab construct to accelerate requirements development.</li> <li>- Integrate with and expand Battle Lab connections to Joint Partners.</li> <li>- Begin deployment of ABMS Digital Infrastructure to the Battle Lab.</li> <li>- Integrate with Airborne Edge Node (Tactical Edge Node Situational Awareness and Edge Processing) and Cloud-Based C2.</li> </ul> <p><b>FY 2023 to FY 2024 Increase/Decrease Statement:</b></p>				



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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>
Fiscal Year 2024 increased significantly due to improved maturity of operational concepts, requirements, and architecture definition with corresponding increase in number of fully defined and approved acquisition efforts (e.g. SD-WAN, Deployable DI, Distributable Battle Management Node) in addition to the continuation of ongoing ABMS DI acquisition efforts (e.g. Battle Lab, tactical and enterprise Cross Domain Solution, content delivery network, datalink integration, and scalable transport).				
<b>Title:</b> C3BM Software and Applications		81.770	84.648	85.200
<b>Description:</b> Under Thrust Area #3, the C3BM Software and Applications effort encompasses ABMS portfolio activities that deliver ABMS Element #4 (applications) to facilitate Elements #5 and #6 (sensor and effects integration). These applications comprise front end (e.g., User Interface and User Experience, or UI/UX, Course of Action Recommendation tools, etc.) and back end microservices (data fusion, data brokering, track management, etc.). Where ABMS DI does not currently provide infrastructure services, C3BM Software and Applications leverages current DAF enterprise solutions (e.g. Cloud One, Platform One, etc.). C3BM Software and Applications develops C2 applications and integrates with DAF Software Factories (e.g. Kessel Run, Kobayashi Maru, etc.) to eliminate duplicative development. These software efforts are complementary and are working to facilitate sharing of data and products from multiple domains and echelons of command to provide decision advantage. C3BM Software development activities are executed with a continuous integration/continuous delivery (CI/CD) model that places operators as a critical member of the team and drives agile software development activities to generate user feedback and consistent product improvement.				
<b>Cloud-Based C2 (CBC2):</b> - CBC2 modernizes battle management and command and control functions by replacing four existing C2 systems with modern Cloud-Based applications, enhanced by AI/ML, to create a common operating picture. Initial development efforts are focused on delivery to Air Defense Sectors (ADS) in NORAD and USNORTHCOM (N&NC) as well as Pacific Air Defense Sector (PADS); however, CBC2 is also working to provide hardware and software solutions that are extensible to additional Combatant Commands (COCOMs). This software suite equips operators executing tactical C2 in CONUS and OCONUS Air Defense Sectors (ADS) with modernized applications to ingest data from civilian and military sensors, fuse it with additional sources of data, conduct mission planning with machine-to-machine ingest of higher echelon tasking products, apply force accountability and risk assessments to a dynamic air picture with thousands of tracks, facilitate real time computing and scoring of Courses of Action (CoA) in order to speed F2T2EA timelines, and provide a UI/UX for battlespace awareness. CBC2 development follows commercial best practices for agile software development with an industry software integrator driving warfighter delivery across several independently contracted microservice developers.				
<b>Distributed Battle Management Apps:</b> - The extensibility of CBC2 aligns to Operational Imperative #2 initiatives associated with distributed battle management and Air Combat Command's Common BMC2 Interface (CBI). Additional software development teams will be established to increase				

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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>
<p>the number of C2 services that the core CBC2 applications for N&amp;NC provide. Requirements currently under development for joint tactical integrated fire control and long range kill chains will trigger development activities for applications and advanced targeting tools development for maturing operational concepts including that are needed at the Tactical Operations Center Family of Systems (TOC FoS) and other maturing operational concepts.</p> <p><b>FY 2023 Plans:</b>            Cloud-Based C2 (CBC2):            - Continue design development activities focused on developing a scalable and extensible data-cloud architecture that leverages artificial intelligence/machine learning (AI/ML) applications and produces a common operating picture.            - Continue developing shared visualization of multiple sources: automated &amp; fused 2D/3D representation of air domain.            - Ingest, fuse, and analyze data from military, government, and commercial sources to multi-classification cloud environments.            - Continue to develop automated and operator-selectable tasking of assets, voice, data and C2.            - Continue integrating new and existing development teams with ABMS Software Integrator to create a micro-services Cloud-Based C2 system for N&amp;NC that is fully government owned.            - Continue building micro-services based software applications that will enable Cloud-Based C2.            - Continue efforts to design and build infrastructure pieces to support Cloud-Based C2 to include but not limited to: platform, cloud, cloud outposts, data transport, tactical data bus, identity management, zero trust network, cyber defense and data storage solutions.            - Continue Quarterly minimum viable product (MVP) releases, iteratively building out the Cloud-Based C2 application/software baseline, targeting minimum viable capability release (MVCR) to N&amp;NC by the end of FY23.            - The Cloud-Based C2 application/software baseline is the starting point of Air Combat Command's (ACC) Common Battle Management Interface (CBI), which is the foundation of ACC's Battle Management Command &amp; Control (BMC2) Roadmap.</p> <p><b>FY 2024 Plans:</b>            Cloud-Based C2 (CBC2):            - Continue design /development activities focused on developing a scalable and extensible data-cloud architecture that leverages artificial intelligence/machine learning (AI/ML) applications and produces a common operating picture.            - Continue developing shared visualization of multiple sources, automated and fused representation of air domain.            - Ingest, fuse, and analyze data from military, government, and commercial sources to multi-classification cloud environments.            - Continue to develop automated and operator-selectable tasking of assets, voice, data and C2.            - Continue integrating new and existing development teams with ABMS Software Integrator to create a micro-services CBC2 system that is fully government owned.            - Continue building micro-services-based software applications that will enable distributed battle management.</p>				

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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>
<p>- Continue efforts to design and build infrastructure to support CBC2 to include but not limited to: platform, cloud, cloud outposts, data transport, tactical data bus, identity management, zero trust network, cyber defense and data storage solutions.</p> <p>- Continue quarterly minimum viable product (MVP) releases, iteratively building out the Cloud-Based C2 application/software baseline and addressing product backlogs associated with N&amp;NC deliveries in pursuit of full operational capability (FOC).</p> <p>Distributed Battle Management Apps:</p> <p>- Continue development based on core CBC2 tactical C2 software suite to extend microservices functionality to support distributed BMC2 operational concepts and CBI requirements and associated capability needs.</p> <p>- Build microservices consistent with CBC2 development approach and in response to capability needs associated with joint tactical integrated fire control, long range kill chains, and other BMC2 functions.</p> <p>- Continue developing shared visualization consistent with CBC2 with automated and fused representation of multiple domains.</p> <p>- Continue integrating new and existing development teams with ABMS Software Integrator to create a microservices CBC2 system that is fully government owned.</p> <p>- Continue quarterly minimum viable product (MVP) releases, iteratively building out extensibility to additional distributed battle management operational concepts (e.g. Tactical Operations Center Family of Systems).</p> <p>- Facilitate transition of advanced targeting tools (e.g. developed under the Hawkeye program) by ensuring compatibility with ABMS digital infrastructure and battle management software.</p> <p><b>FY 2023 to FY 2024 Increase/Decrease Statement:</b> Fiscal Year 2024 increased due to additional software teams supporting distributed battle management operational concepts and ACC's CBI.</p>				
<p><b>Title:</b> C3BM Aerial Networking</p> <p><b>Description:</b> Under Thrust Area #4, the C3BM Aerial Networking efforts encompass ABMS portfolio activities that deliver ABMS Element #1 and 2 (secure processing and connectivity) to facilitate Elements #5 and #6 (sensor and effects integration). AEN leverages government reference architecture and the ongoing ABMS DI investments to connect select Tac Air assets and C2 functions to the ABMS cloud at the tactical edge, enhancing Situational Awareness and decision making at multiple echelons. AEN's first implementation, known as Capability Release #1, includes a communications subsystem, platform integration, and a tactical edge node, CR #1 will be on a KC-46. Onboard secure compute/storage infrastructure will host mission-relevant applications and be developed as a roll-on/roll-off capability using commercial solutions. Further, C3BM Aerial Networking includes an effort, known as Phalanx Griffon, to extend AEN capabilities to tactically relevant aircraft based on maturing operational concepts and aerial network road mapping activities. This effort will initially be based on the F-15E/EX which can be traced back to Operational Imperative #2 operational analysis and ACC input. AEN prototype efforts will inform future design and fielding activities for platforms and C2 functions.</p>		109.682	65.846	65.254

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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>
<p><b>FY 2023 Plans:</b>            Capability Release #1:            - Complete integration of capability on the KC-46 and conduct flights for test, military utility assessments, and Concept of Operations experimentation.            - Complete development of a palletized compute and store enclave with local cloud storage, cloud synchronization, and network Management functions.            - Complete build of additional podded systems to meet quantities in the requirement.            - Maximize use of digital engineering, modern software development practices, and open architecture principles; develop Technical Data Package to enable potential follow-on development and integration activities.</p> <p><b>FY 2024 Plans:</b>            Capability Release #1:            - Continue development and test activities associated with the CR #1 communications subsystem, including test and demonstration of skill development (e.g. MADL, DLOS, etc.) and preparations for security certifications.            - Complete integration of Tactical Edge Node capability on the KC-46 and conduct planning for flights for test, military utility assessments, and Concept of Operations experimentation.            - Complete development of a palletized compute and store enclave with local cloud storage, cloud synchronization, and network management functions.            - Maximize use of digital engineering, modern software development practices, and open architecture principles; develop Technical Data Package to enable potential follow-on development and integration activities.            - Demonstrate fieldable KC-46 capability in FY24 via Tactical Edge Node hardware and organic KC-46A communications capabilities.</p> <p>Phalanx Griffon:            - Complete study for F-15E/EX platform integration options and develop mission architecture for acquisition planning activities.            - Leverage CR#1 capabilities as applicable (e.g. security cryptographic module, or SCM) to continue development of open architecture multi-function processor tailored for hosting on tactical aircraft (i.e. F-15E/EX).            - Continue development of content routing and communications software.            - Conduct planning for test and demonstration activities associated with Phalanx Griffon.            - Maximize use of digital engineering, modern software development practices, and open architecture principles; develop Technical Data Package to enable potential follow-on development and integration activities.</p> <p><b>FY 2023 to FY 2024 Increase/Decrease Statement:</b></p>				

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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>
Work remains consistent from Fiscal Year 2023 to Fiscal Year 2024 as the team will finish out deployment of KC-46 Tactical Edge Node hardware and communication capabilities and will continue work for hosting capability on the F-15E/EX.				
<b>Accomplishments/Planned Programs Subtotals</b>		262.452	237.332	500.575
<b>D. Other Program Funding Summary (\$ in Millions)</b>				
N/A				
<b>Remarks</b>				
<b>E. Acquisition Strategy</b>				
<p>ABMS is building a portfolio of acquisition efforts and should not be viewed as a monolithic program. The first acquisition effort, formerly named Capability Release #1 (CR #1) and now referred to as AEN CR#1 under the C3BM Ariel Networking Thrust Area, is an ACAT II effort. The CR#1 acquisition strategy was approved by the Service Acquisition Executive (SAE) on 15 Jun 21. Cloud-Based C2 (CBC2) is Software Pathway program formerly captured under CR#1 and its acquisition strategy was approved by the SAE in May 2022. Aside from AEN and CBC2, the ABMS Digital Infrastructure project acquisition strategy was approved by the SAE in Nov 21 in order to initiate development of the ABMS Consortium. Follow-on Digital Infrastructure (DI) acquisition plans for Distributable Battle Management Node (DBMN), Software Defined Wide Area Networking (SD-WAN), and Deployable Digital Infrastructure leveraged the Middle Tier of Acquisition Rapid Prototyping Acquisition Pathway and were approved by DAF PEO C3BM in October 2022 and January 2023. Additional acquisition strategies will be developed and approved during the remainder of FY23.</p> <p>The ABMS agile acquisition strategy and development approach is modeled after the path of commercial innovation and internet of things technology practices. The acquisition strategy breaks capabilities - that might traditionally be developed as a monolith in the government - up into modular components and then integrates them through open standards and an open architecture derived from ASE driven analysis. Modularity and openness enable increased competition and continuous innovation, as well as more rapid upgrade of product capabilities. Software development and hardware development can both follow this path—a proven, successful model that is employed in the commercial world as well as in agile government entities.</p> <p>The iterative nature of technology and speed of technical obsolescence in the 21st century digital age mandate an agile approach to capability development, integration, and delivery that is both rapid and continuous. DAF PEO C3BM will make targeted investments in select areas and technologies to stabilize and integrate core operational capabilities, expedite the delivery of warfighter capability, and close operational gaps. This model is maturing FY2023 and FY2024, as is a number of digital infrastructure and software development efforts are in execution deploying minimum viable products across the DAF in keeping with a continuous integration/continuous delivery mindset where operators involved in regular feedback loops and a variety of traditional and non-traditional defense contractors involved in delivery.</p> <p>To enable the speed and agility required by this acquisition strategy, the ABMS acquisition efforts have developed a contracting strategy that is highly flexible. Though the program employs the full range of contracting authorities, ABMS is currently utilizing, but not limited to, the following contracting vehicles to execute requirements: 1) JADC2 Multiple-Award, Multi-Level Security (MA-MLS) Indefinite Delivery/Indefinite Quantity (ID/IQ) vehicle; 2) JADC2 Broad Agency Announcement with Calls to</p>				

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2024 Air Force		<b>Date:</b> March 2023
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604003F / <i>Advanced Battle Management System (ABMS)</i>	
include a Call soliciting sources to participate in Cooperative Research and Development Agreements (CRADAs); 3) JADC2 Commercial Solutions Opening; 4) Small Business Innovation Research Phase III efforts; and 5) already existing contract vehicles where ABMS acquisition efforts are within scope. Additional vehicles will be considered on an as-needed basis.		

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Air Force												Date: March 2023			
Appropriation/Budget Activity 3600 / 4				R-1 Program Element (Number/Name) PE 0604003F / Advanced Battle Management System (ABMS)				Project (Number/Name) 640141 / Advanced Battle Management System (ABMS)							
Product Development (\$ in Millions)				FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
ASE: Digital Engineering	Various	DAF PEO C3BM: Multiple : TBD	-	0.000	Oct 2021	0.000	Oct 2022	7.000	Oct 2023	0.000		7.000	Continuing	Continuing	-
ASE: Mission Domain Architecture & Mission Integration Team	Various	DAF PEO C3BM: Multiple : TBD	-	0.000	Oct 2021	0.000	Oct 2022	64.000	Oct 2023	0.000		64.000	Continuing	Continuing	-
ASE: Operational Response Team	Various	DAF PEO C3BM: Multiple : TBD	-	0.000	Oct 2021	0.000	Oct 2022	9.000	Oct 2023	0.000		9.000	Continuing	Continuing	-
ABMS Digital Infrastructure (ABMS DI)	Various	DAF PEO C3BM: Multiple : TBD	-	41.347	Jun 2022	58.848	Jun 2023	226.801	Jun 2024	0.000		226.801	Continuing	Continuing	-
ABMS Consortium	C/FP	DAF PEO C3BM: Multiple : TBD	-	23.403	Jun 2022	24.100	Jun 2023	24.820	Jun 2024	0.000		24.820	Continuing	Continuing	-
ABMS Battle Lab	Various	DAF PEO C3BM: Various : TBD	-	0.000	Jun 2022	0.000	Jun 2023	10.000	Jun 2024	0.000		10.000	Continuing	Continuing	-
Cloud-Based Command and Control (CBC2)	Various	DAF PEO C3BM: Multiple : TBD	-	80.435	Sep 2022	82.283	Sep 2023	78.200	Sep 2024	0.000		78.200	Continuing	Continuing	-
Distributed Battle Management Applications (DBMA)	Various	DAF PEO C3BM: Multiple : TBD	-	0.000	Sep 2022	0.000	Sep 2023	6.000	Sep 2024	0.000		6.000	Continuing	Continuing	-
Airborne Edge Node (AEN) CR#1	Various	DAF PEO C3BM: Multiple : TBD	-	84.830	Sep 2022	39.959	Sep 2023	23.475	Sep 2024	0.000		23.475	Continuing	Continuing	-
Phalanx Griffon	Various	DAF PEO C3BM: Multiple : TBD	-	0.000	Sep 2022	0.000	Sep 2023	4.000	Sep 2024	0.000		4.000	Continuing	Continuing	-
SBIR/STTR	TBD	TBD : TBD : TBD	-	0.000	Oct 2021	7.490	Oct 2022	18.321	Oct 2023	0.000		18.321	Continuing	Continuing	-
<b>Subtotal</b>			-	230.015		212.680		471.617		0.000		471.617	Continuing	Continuing	N/A
Test and Evaluation (\$ in Millions)				FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
ABMS DI: Test	Various	Various : TBD	-	6.250	Jan 2022	3.891	Jan 2023	8.500	Jan 2024	-		8.500	Continuing	Continuing	-
CBC2: Test	Various	Various : TBD	-	1.335	Jan 2022	2.365	Jan 2023	1.000	Jan 2024	-		1.000	Continuing	Continuing	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Air Force												Date: March 2023			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
3600 / 4				PE 0604003F / Advanced Battle Management System (ABMS)				640141 / Advanced Battle Management System (ABMS)							
Test and Evaluation (\$ in Millions)				FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
AEN CR#1: Test	Various	Various : TBD	-	5.545	Jan 2022	2.600	Jan 2023	2.600	Jan 2024	-	-	2.600	Continuing	Continuing	-
OGC-Test	Various	Various : TBD	-	0.000	Jan 2022	1.240	Jan 2023	0.300	Jan 2024	-	-	0.300	Continuing	Continuing	-
<b>Subtotal</b>			-	13.130		10.096		12.400		-	-	12.400	Continuing	Continuing	N/A
Management Services (\$ in Millions)				FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
FFRDC	Various	Various : TBD	-	7.485	Oct 2021	6.115	Oct 2022	6.770	Oct 2023	-	-	6.770	Continuing	Continuing	-
A&AS	Various	Various : TBD	-	5.169	Oct 2021	4.867	Oct 2022	5.013	Oct 2023	-	-	5.013	Continuing	Continuing	-
Other Support	Various	Various : TBD	-	6.653	Oct 2021	3.574	Oct 2022	4.775	Oct 2023	-	-	4.775	Continuing	Continuing	-
<b>Subtotal</b>			-	19.307		14.556		16.558		-	-	16.558	Continuing	Continuing	N/A
<b>Project Cost Totals</b>			-	262.452		237.332		500.575		0.000		500.575	Continuing	Continuing	N/A
<b>Remarks</b>															

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Exhibit R-4, RDT&E Schedule Profile: PB 2024 Air Force						Date: March 2023																						
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)																				
3600 / 4				PE 0604003F / Advanced Battle Management System (ABMS)				640141 / Advanced Battle Management System (ABMS)																				
	FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027				FY 2028			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<b>ABMS</b>																												
Architecture and Systems Engineering (ASE)																												
ASE: Digital Engineering																												
ASE: Mission Domain Architecture and Mission Integration Team																												
ASE: Operational Response Team																												
ABMS Digital Infrastructure (ABMS DI)																												
ABMS Consortium																												
ABMS Battle Lab																												
ABMS DI: Test																												
Cloud-Based Command and Control (CBC2)																												
Distributed Battle Management Applications (DBMA)																												
CBC2 Test																												
Airborne Edge Node (AEN) CR#1																												
Phalanx Griffon																												
AEN CR#1: Test																												
OGC-Test																												
FFRDC																												
A&AS																												
Other Support																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details: PB 2024 Air Force</b>			<b>Date: March 2023</b>	
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604003F / <i>Advanced Battle Management System (ABMS)</i>	<b>Project (Number/Name)</b> 640141 / <i>Advanced Battle Management System (ABMS)</i>		

**Schedule Details**

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>ABMS</b>				
Architecture and Systems Engineering (ASE)	1	2024	4	2028
ASE: Digital Engineering	1	2024	4	2028
ASE: Mission Domain Architecture and Mission Integration Team	1	2024	4	2028
ASE: Operational Response Team	1	2024	4	2028
ABMS Digital Infrastructure (ABMS DI)	1	2022	4	2028
ABMS Consortium	3	2022	4	2028
ABMS Battle Lab	1	2024	4	2028
ABMS DI: Test	2	2022	4	2024
Cloud-Based Command and Control (CBC2)	1	2022	4	2025
Distributed Battle Management Applications (DBMA)	1	2024	4	2025
CBC2 Test	2	2022	4	2025
Airborne Edge Node (AEN) CR#1	1	2022	4	2026
Phalanx Griffon	1	2024	4	2026
AEN CR#1: Test	2	2022	4	2026
OGC-Test	2	2022	4	2028
FFRDC	1	2022	4	2028
A&AS	1	2022	4	2028
Other Support	1	2022	4	2028



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