Accelerating Innovation: Rapid Fielding of Aerospace and Defense Solutions

GLOBAL PRODUCT DATA
INTEROPERABILITY
SUMMIT 2025

Danny Poisson, Field CTO Federal Aerospace & Defense

Presenters Bio

Danny Poisson

PTC

Field CTO for Federal Aerospace & Defense

Professional Timeline (36 Years of A&D Related Experience):

- 8 years with Bath Iron Works (BIW) in Mechanical Engineering Design
- 8 years with CSC at BIW as Business Analyst / Developer
- 3 years with PTC Consulting as Solution Master Architect
- 14 years with Raytheon IDS and GBS, primarily in PDM/PLM
- 14 months with L3Harris, Digital Engineering Transformation
- Rejoined PTC as Field CTO for FA&D in 2023

Professional Achievements

- Architected and built the largest instance of Windchill PDMLink in the world
- Raytheon CIO Excellence in Technology Awards: 2019, 2018, 2013 and 2012
- CIO Innovation Award Recipient for Digital Thread / Neural Network in 2017
- Raytheon IDS 2010 President's Award
- PTC Excellence award in 2006 and 2007
- AEGIS Excellence Award in 2002

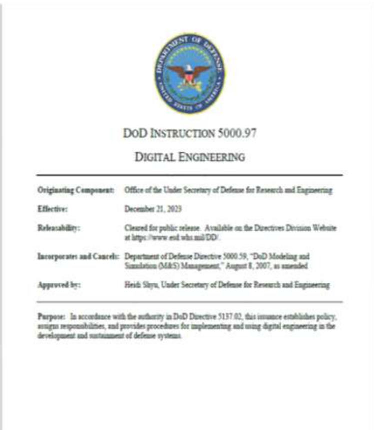
KEY THEMES SHAPING FUTURE MISSION OUTCOMES

"A critical weapon now exists to address evolving threats and complex operational environments – not a new type of gun, tank or plane, but digital innovation"

Digital Modernization & Transformation

…adoption of advanced digital technologies

MBSE / ALM	CAD	PLM	Simulation
Ensure Mission Compliance	*Design Smarter*	*Ensure Product Data*	*Ensure Mission Success*

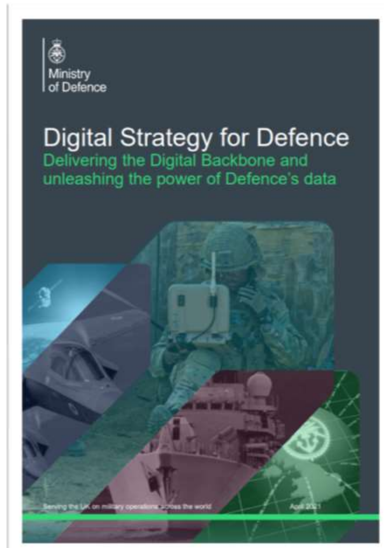


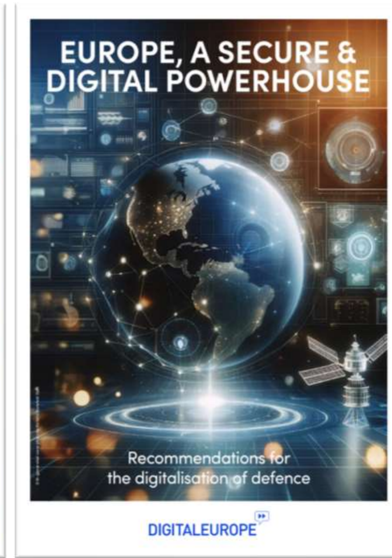
DoD Instruction 5000.97

Digital Engineering

Originating Component:	Office of the Under Secretary of Defense for Research and Engineering
Effective:	December 21, 2023
Releasability:	Cleared for public release. Available on the Directives Division Website at https://www.esd.whs.mil/DD/.
Incorporates and Cancels:	Department of Defense Directive 5000.59, "DoD Modeling and Simulation (M&S) Management," August 8, 2007, as amended
Approved by:	Heidi Shyu, Under Secretary of Defense for Research and Engineering

Purpose: In accordance with the authority in DoD Directive 5137.02, this issuance establishes policy, assigns responsibilities, and provides procedures for implementing and using digital engineering in the development and sustainment of defense systems.





DE ECOSYSTEM AND SIMULATION CORE OF INNOVATION & AGILITY

Digital Engineering Ecosystem

An interconnected, collaborative, and technology-driven environment that integrates tools, processes, data, and stakeholders to enable the design, development, testing, and lifecycle management of complex systems.

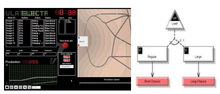
It leverages digital technologies to streamline engineering workflows, enhance decision-making, and optimize system performance through real-time data sharing and model-based approaches.

Simulation

Computational process of creating and executing virtual models that replicate the behavior, performance, and interactions of physical systems or processes in a digital environment.

It enables engineers to analyze, predict, and optimize system performance under various conditions without physical prototyping, using numerical methods, algorithms, and data-driven techniques.

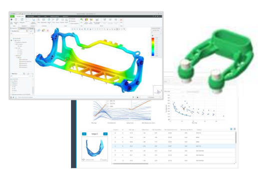
WEAVING SIMULATION INTO THE DIGITAL THREAD



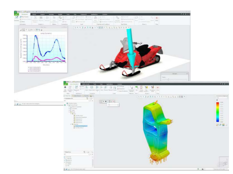
ANSYS

3rd Party…

System & Functional Simulation



Simulation-led product design



Design Simulation

Process Simulation

Digital Twin - closing the loop with real-world performance-based data

ptc / Ansys part of SYNOPSYS

Plan | **Concept** | **Design** | **Validate** | **Produce** | **Sustain**

PTC - ANSYS DIGITAL ENGINEERING BLUEPRINT

System Engineering

- *Requirements Management* — Codebeamer
- *Test Management & Automation* — Codebeamer
- *System Modeling* — System Arch Modeler (SAM)
- *Functional Safety* — Ansys Safety
- *System Modeling* — Windchill Modeler
- *Simulation* — Mission and System Simulation

Hardware Engineering

- *CAD* — Creo
- *Product Lifecycle Mgmt* — Windchill
- *Simulation* — Ansys Simulation
- *Materials* — Ansys Granta

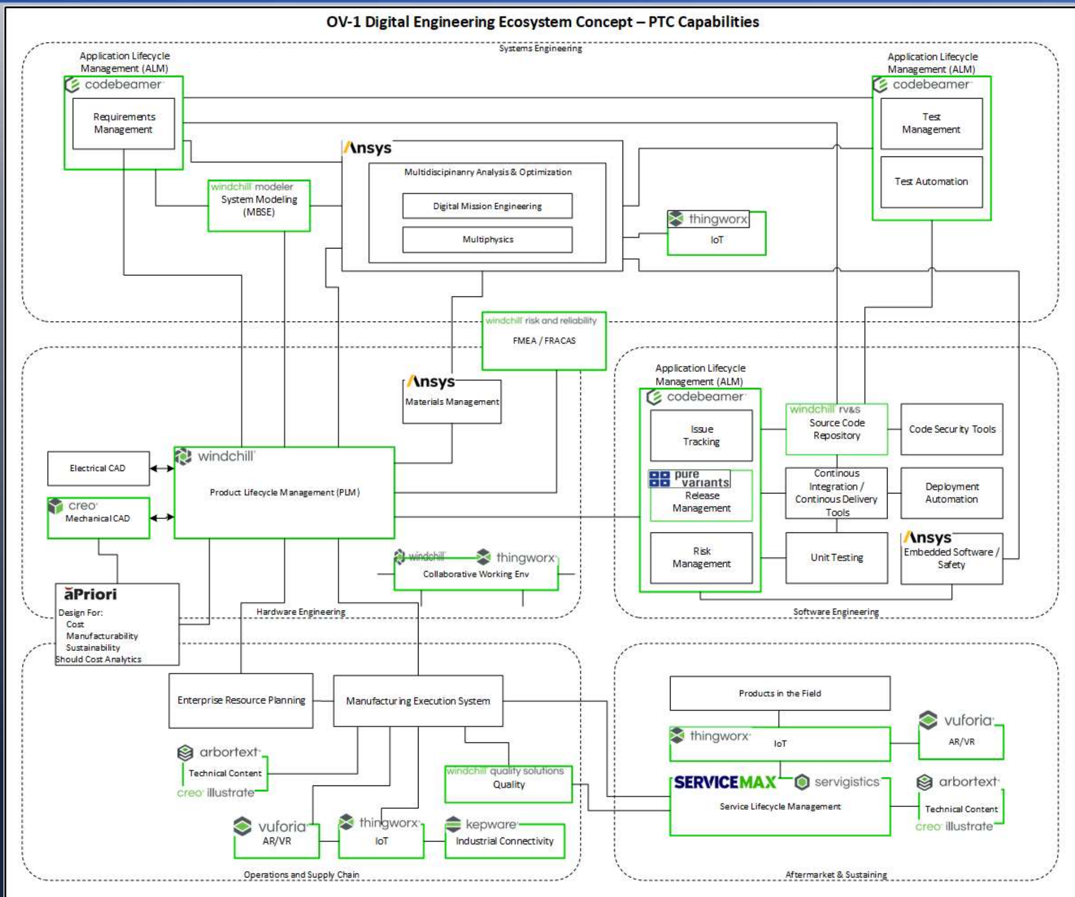
Software Engineering

- *Issue track/release mgmt.* — Codebeamer/Pure
- *Embedded SW Dev* — Ansys SCADE

ptc

Ansys

DIGITAL ENGINEERING REFERENCE ARCHITECTURE



Business Process Domains

Thoughtful, Value Add First Approach to Enable Functions and Disciplines

Tools

Purpose Driven Digital Technologies Used To Create, Operate, Collect Data, and Maintain Physical Products

Digital Thread

An Architecture That Creates and Manages Intelligent Product Data Throughout It's Lifespan

A REAL ENGINEERING STORY POWERED BY PTC & Ansys

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Demo Overview

Industry Vertical: FA&D

Business Initiative Coverage Highlights

- Accelerate product innovation throughout lifecycle
- Efficiently manage product & software complexity
- Streamline product development
- Improve velocity of new product introduction
- Accelerate speed to industrialization
- Streamline compliance / Ensure adherence to regulations

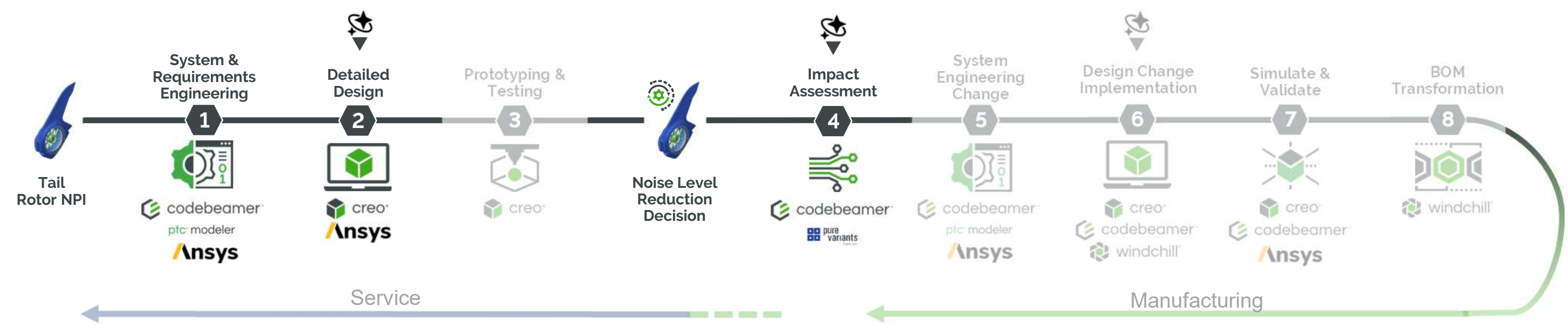
Solution Capability Coverage Highlights

- Requirements & Systems Engineering
- Detailed Design
- Product Data Management
- Enterprise Change Management & more …

AI Capability Coverage Highlights

- Codebeamer AI – Requirements Assistant
- Windchill AI – Part Rationalization
- ServiceMax AI – WO Summary & Chat

Story Flow



REQUIREMENTS, SIMULATION & ANALYSIS

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Ansys pure variants codebeamer ptc modeler

1

NPI Tail Rotor

- 1.1 Introducing New Helicopter
- 1.2 Product Requirements Creation
- 1.3 System Model Design
- 1.4 Mission Analysis Process
- 1.5 System Model Refinement

Initial Rotor Design

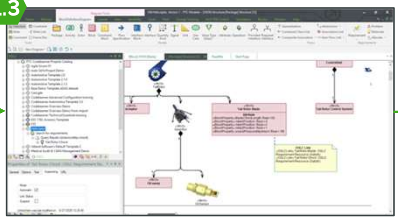
1.1 Introducing New Helicopter Model

The **Systems Engineer** begins discussing the new helicopter and planning to validate the initial design to requirements

1.2 Product Requirements Creation

Requirements Engineer creates **Product Requirements** and associated **Test Cases** based on Regulatory Requirements in Codebeamer

1.3 System Model Design

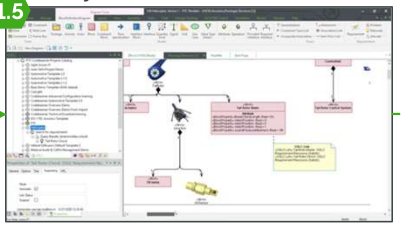


Using **PTC Modeler,** the System Model is created abstractly with general parts and no details

1.4 Mission Analysis Process

With requirements and an initial system model as inputs. **Ansys Model Center** runs initial model simulations and **Ansys STK**

1.5 System Model Refinement



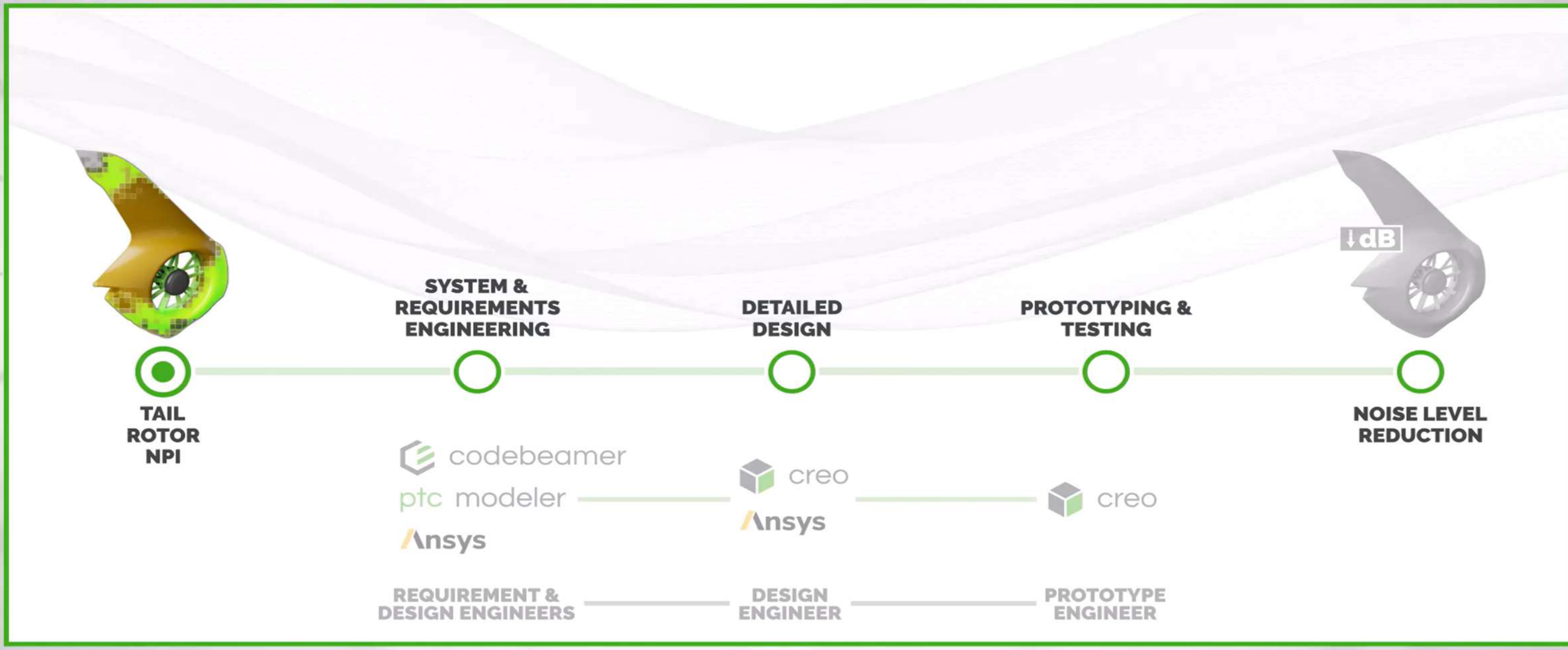
With the results from **Ansys Model Center** and **STK** they are then ingested into **Modeler** to refine the System Model

Systems Engineer

Process Inputs:
- Product Regulatory Requirements
- General Functional Requirements

Process Outputs:
- Design Specifications
- Detailed System Model

ENGINEERING (PART 1)



INITIAL ROTOR DESIGN

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Ansys creo windchill

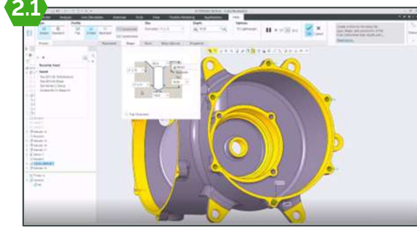
2 Requirements, Simulation & Analysis

- **2.1** Simulation Driven Design
- **2.2** Part Optimization
- **2.3** Composite Layup Design
- **2.4** Design Check-In

Prototyping & Testing

Product Development

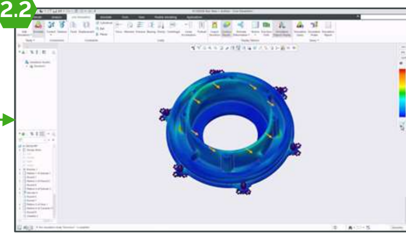
2.1



Using the Specifications from Model Center we do **Initial Core Modeling** on different components of the Tail Rotor

Simulation-Driven Design

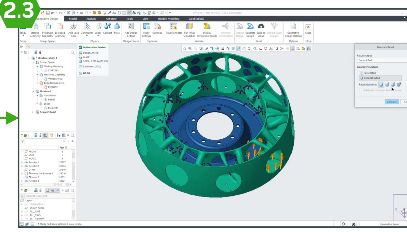
2.2



Using **Creo Simulation Live** we test out different designs of a component and run structural and modal simulations on it

Part Optimization

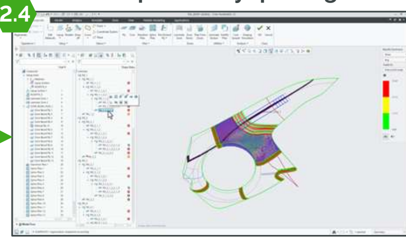
2.3



Thinking of Part Optimization, the Design Engineer uses **Generative Design** to design a different version of the new rotor hub that is stronger

Composite Layup Design

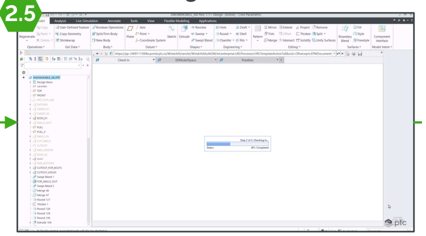
2.4



The Outer Shell of the Tail Rotor is designed using **Creo Composites (Draping, Plies, Laminate Sections, Solidification)**

Design Check-In

2.5



We **check the design into Windchill** to prepare for prototype manufacturing

Design Engineer

Process Inputs:
- Design Specifications
- Windchill Instance
- Test Case Definitions

Process Outputs:
- First Tail Rotor Design
- Composite Design Part
- Generative Design Hub

ENGINEERING (PART 1)

1. EFFICIENTLY MANAGE PRODUCT & SOFTWARE COMPLEXITY
2. IMPROVE VELOCITY OF NEW PRODUCT INTRODUCTION
3. ACCELERATE SPEED TO INDUSTRIALIZATION
4. STREAMLINE PRODUCT DEVELOPMENT

TAIL ROTOR NPI

SYSTEM & REQUIREMENTS ENGINEERING

DETAILED DESIGN

PROTOTYPING & TESTING

NOISE LEVEL REDUCTION

codebeamer

ptc modeler

Ansys

creo

Ansys

creo

REQUIREMENT & DESIGN ENGINEERS

DESIGN ENGINEER

PROTOTYPE ENGINEER

Impact Assessment

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pure variants
codebeamer

4

Prototyping & Testing

Noise Level Reduction

4.1 Open Change Request (CB)

4.2 Requirement Change

4.2 AI Requirements Validation

4.3 Impact Assessment

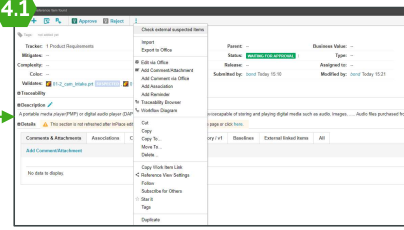
4.4 Requirement Variant Spec (PV)

System Level Change Request

Noise Level Reduction

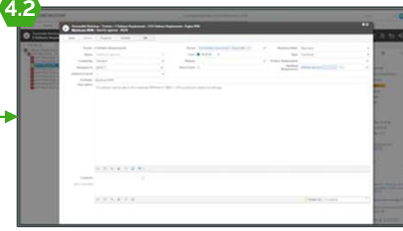
The result coming from the prototype test show that **we are meeting** the **85 dB noise level requirement**

4.1 Open Change Request



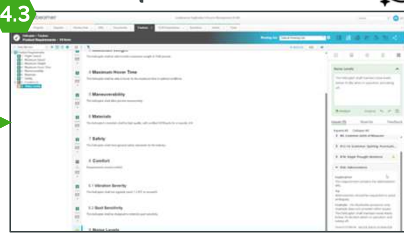
The requirement engineer opens a change request in Codebeamer to modify the noise level requirement since the company wants to beat it

4.2 Requirement Change



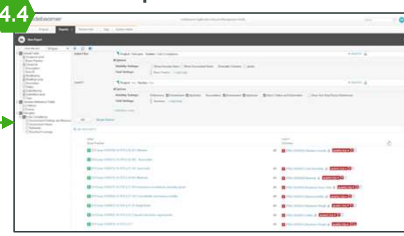
The requirement engineer modifies the **noise level requirement** to be at **75 dB** instead of 85 dB

4.3 AI Requirements Validation



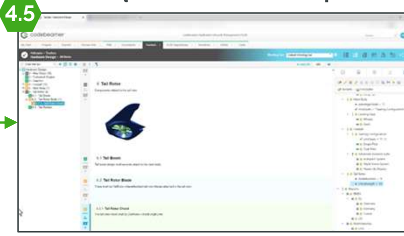
Requirement change is validated using AI Copilot capabilities

4.4 Impact Assessment



All requirements are affected by the requirement change in Codebeamer, run traceability report

4.5 Requirement Variant Spec



The change propagates into the variants of the helicopter as well

Requirements Engineer

Process Inputs:

- Prototype Test Results
- Variant Connections

Process Outputs:

- Codebeamer Change Request
- Requirement Change

ENGINEERING (PART 2)

1	2	3	4	5
ENHANCE GOVERNANCE & LIFECYCLE TRACEABILITY	IMPROVE VELOCITY OF NEW PRODUCT INTRODUCTION	EFFICIENTLY MANAGE PRODUCT & SOFTWARE COMPLEXITY	ENSURE PRODUCT & SERVICE QUALITY	DRIVE CONTINUOUS IMPROVEMENT

IMPACT ASSESSMENT	SYSTEM ENGINEERING CHANGE	DESIGN CHANGE IMPLEMENTATION	SIMULATE & VALIDATE	BOM TRANSFORMATION
codebeamer pure variants from ptc	ptc modeler Ansys	windchill creo codebeamer	creo codebeamer Ansys	windchill

PRODUCT OWNER — SYSTEMS ENGINEER — DESIGN ENGINEER — MANUFACTURING ENGINEER ptc®

THANK YOU

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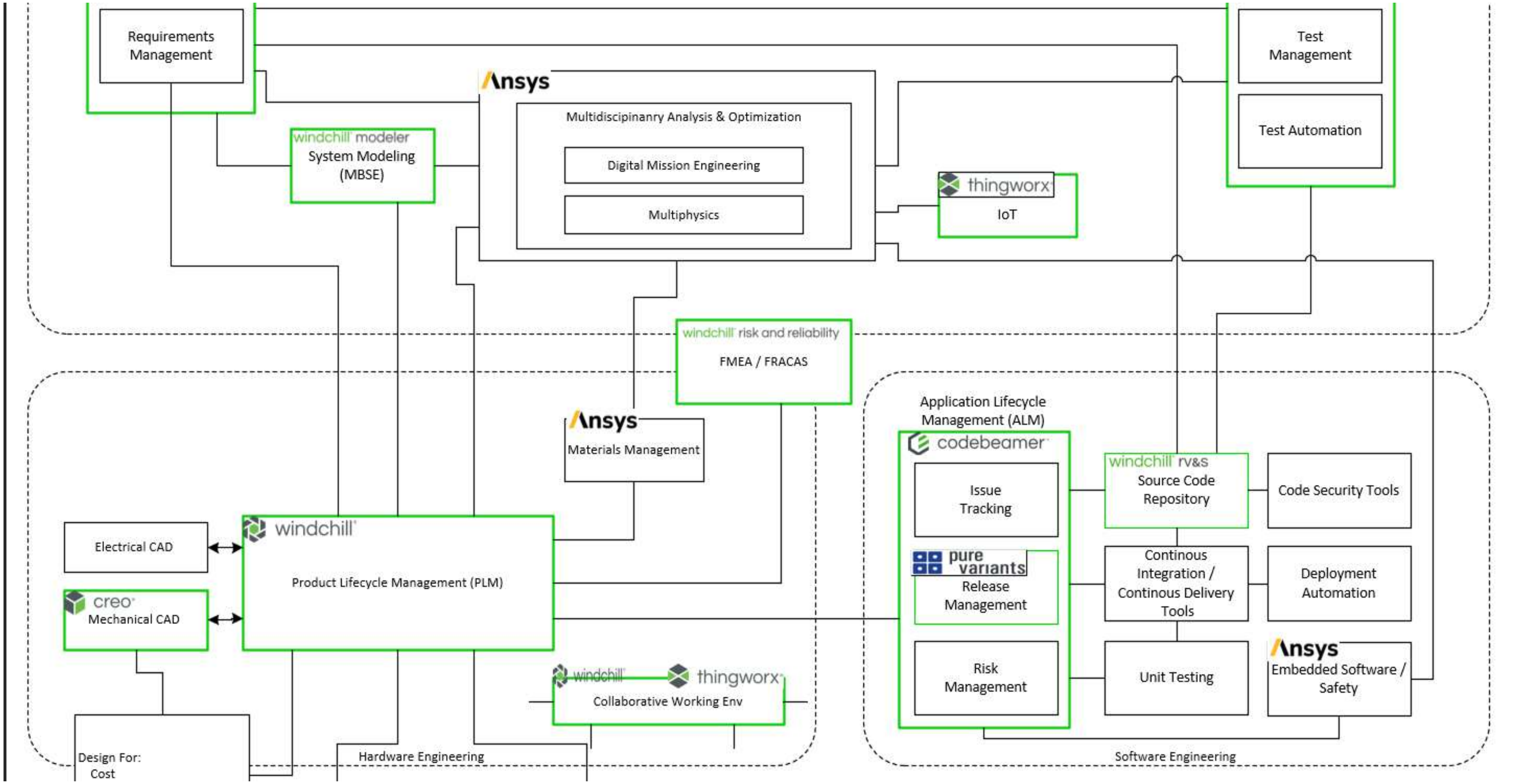
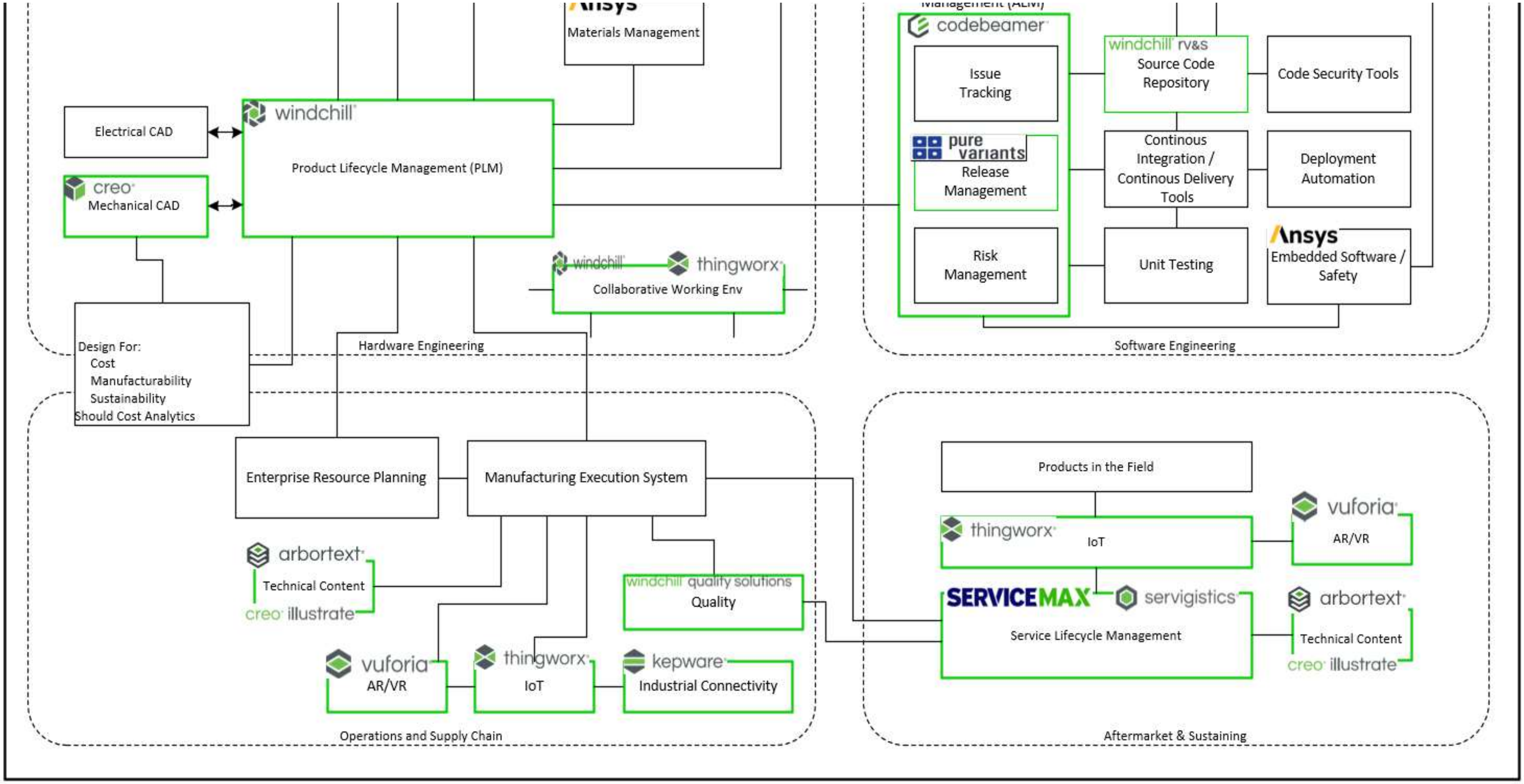

Requirements Management
Test Management
Test Automation
Ansys
Multidiscipinanry Analysis & Optimization
Digital Mission Engineering
Multiphysics
windchill modeler
System Modeling (MBSE)
thingworx
IoT
windchill risk and reliability
FMEA / FRACAS
Ansys
Materials Management
Application Lifecycle Management (ALM)
codebeamer
Issue Tracking
pure variants
Release Management
Risk Management
windchill rv&s
Source Code Repository
Code Security Tools
Continous Integration / Continous Delivery Tools
Deployment Automation
Unit Testing
Ansys
Embedded Software / Safety
Electrical CAD
creo
Mechanical CAD
windchill
Product Lifecycle Management (PLM)
windchill
thingworx
Collaborative Working Env
Design For:
Cost
Hardware Engineering
Software Engineering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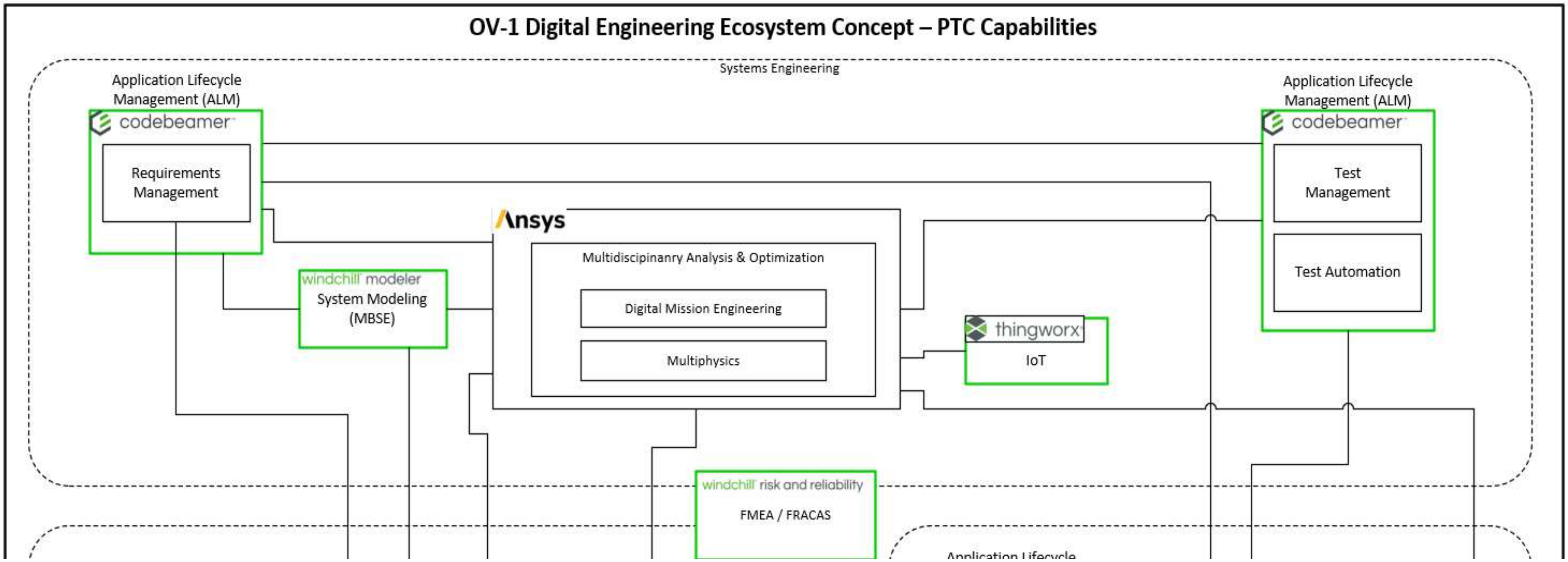
Collaborative Working Env
Design For:
Cost
Manufacturability
Sustainability
Should Cost Analytics
Hardware Engineering
codebeamer
Issue Tracking
pure variants
Release Management
Risk Management
windchill rv&s
Source Code Repository
Code Security Tools
Continous Integration / Continous Delivery Tools
Deployment Automation
Unit Testing
Ansys
Embedded Software / Safety
Software Engineering
Enterprise Resource Planning
Manufacturing Execution System
arbortext
Technical Content
creo illustrate
windchill quality solutions
Quality
vuforia
AR/VR
thingworx
IoT
kepware
Industrial Connectivity
Operations and Supply Chain
Products in the Field
thingworx
IoT
vuforia
AR/VR
SERVICEMAX
servigistics
Service Lifecycle Management
arbortext
Technical Content
creo illustrate
Aftermarket & Sustaining


OV-1 Digital Engineering Ecosystem Concept – PTC Capabilities
Systems Engineering
Application Lifecycle Management (ALM)
codebeamer
Requirements Management
Application Lifecycle Management (ALM)
codebeamer
Test Management
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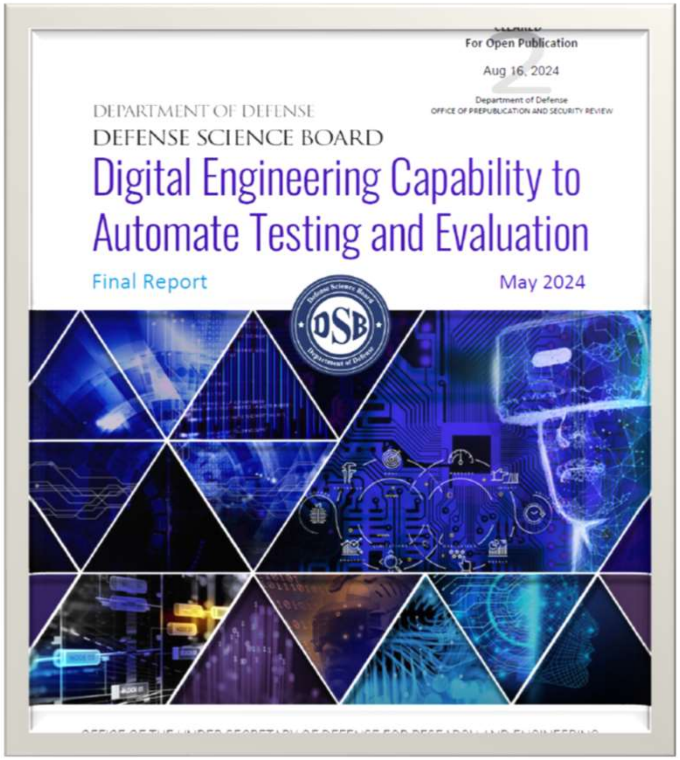
DEFENSE SCIENCED BOARD

Cited Benefits of Digital Engineering



Reduced development time and risk: The B-21 Raider program utilized digital engineering extensively, resulting in a notable reduction in development time. According to Tom Jones, President of Northrop Grumman Aeronautics System, "by being able to burn down a lot more risk digitally, we're able to take this step, which cuts years out of the overall development program and really wrings a lot of risk out."[16]

Years Cut

80% Reduction

Improved design accuracy: The T-7 Red Hawk program, which embraced DE principles, has shown impressive savings. According to Boeing, the T-7 program achieved 75% increase improvement in first-time engineering quality, 80% reduction in assembly hours, and 50% reduction in software development and verification time compared to traditional aircraft development programs. This cost efficiency was attributed to the effective use of DE tools and processes throughout the program.[17]

Design optimization: Sentinel, formerly known as the Ground Based Strategic Deterrent, explored 'six billion iterations' to identify the optimal design for cost and performance.[18]

6B Iterations

$215M Avoided

Reduced cost and downtime: Aviation battalions with CH-47s avoided $24 million in costs and realigned 6,237 maintenance hours to higher priority systems over a six-year period, though the exact span is not specified. The Army also reported avoiding $215 million in costs and realigned 5,324 maintenance hours to higher priorities after using predictive maintenance on UH-60 Blackhawk helicopters over a six-year period.[19]

Source: https://dsb.cto.mil/wp-content/uploads/2024/08/DSB_DE_Final-Report_050124_Stamped.pdf