CDAO

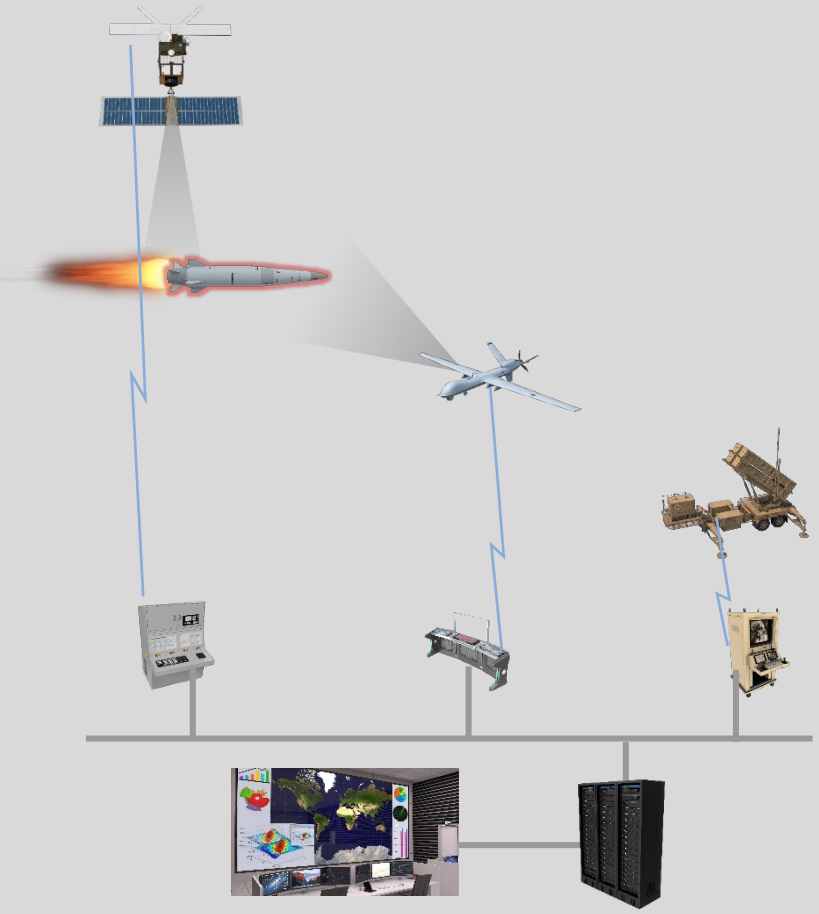
Chief Digital & Artificial Intelligence Office

# Combined Joint All-Domain Command & Control (CJADC2)

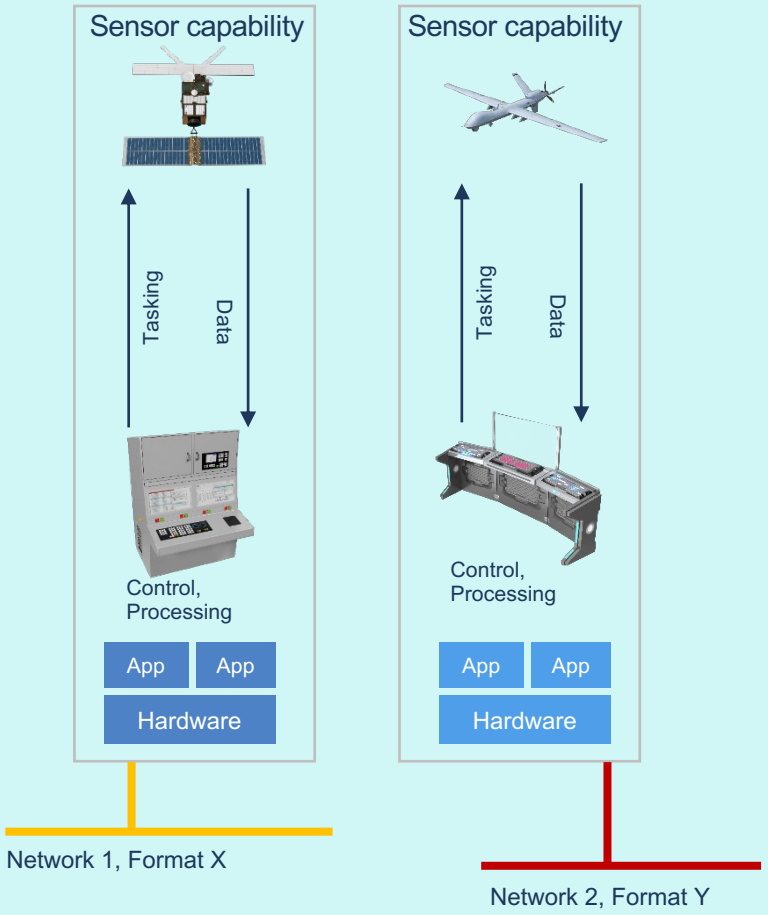
The overall classification of this brief is: UNCLASSIFIED

# CJADC2 - The problem we are facing

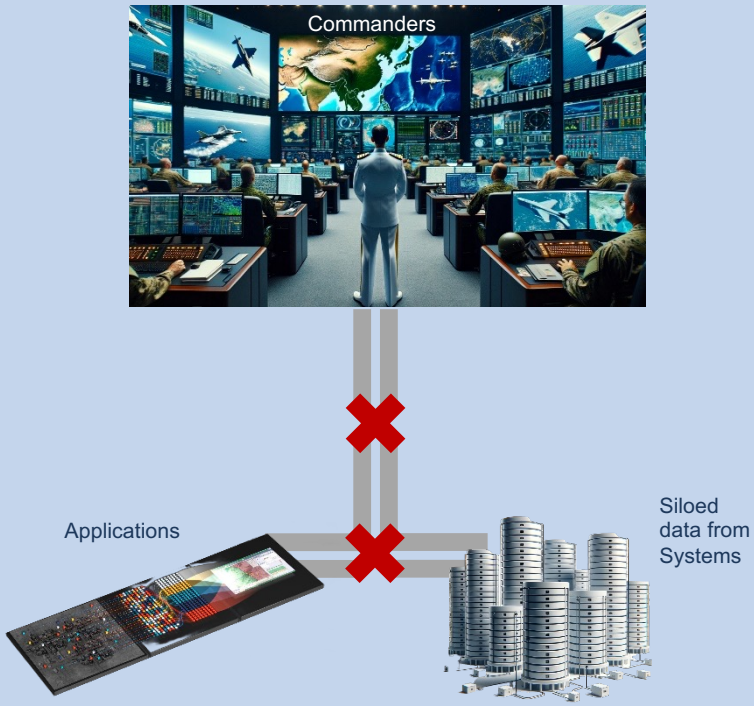
**Combat effectiveness increasingly relies upon new & evolved operational concepts, each of which is a digitally integrated system-of-systems**



**Systems are vertically stove-piped, run on different networks, have different computing architectures, and rarely make data easily accessible**




**Commanders, operators, acquirers, and industry struggle to access data, integrate data, and build and deploy software applications on top of data that enable more effective military operations.**





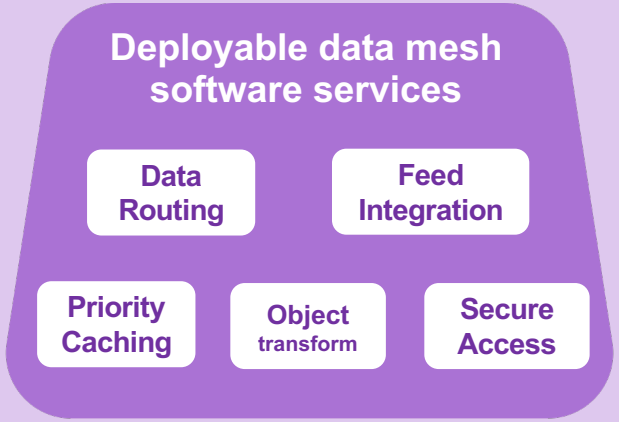

**CDAO cannot solve these problems alone; but it can facilitate solutions**

# CDAO - What we are doing // Objectives

## Data Integration Layer
line of effort

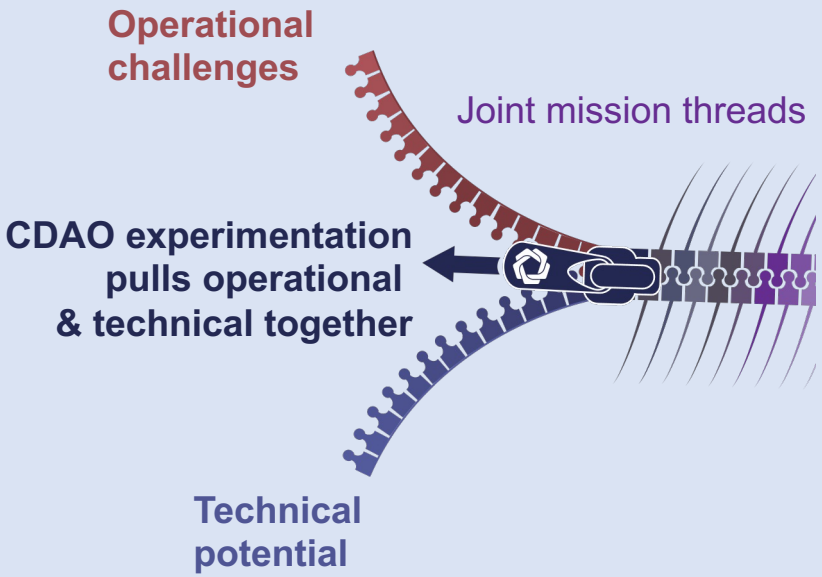
**Create a set of software services that improve the warfighter's ability to harness data by:**

**enhance data routing, automate feed integration, optimize caching, transform robust data objects, and bolster security, and deploy these services on partner hardware for rigorous testing and refinement**




## Experimentation
line of effort

**Identify critical operational challenges, allocate resources to integrate diverse data sources for mission-critical outcomes, and employ a disciplined methodology of measurement and modeling in a continuous campaign of structured experimentation**



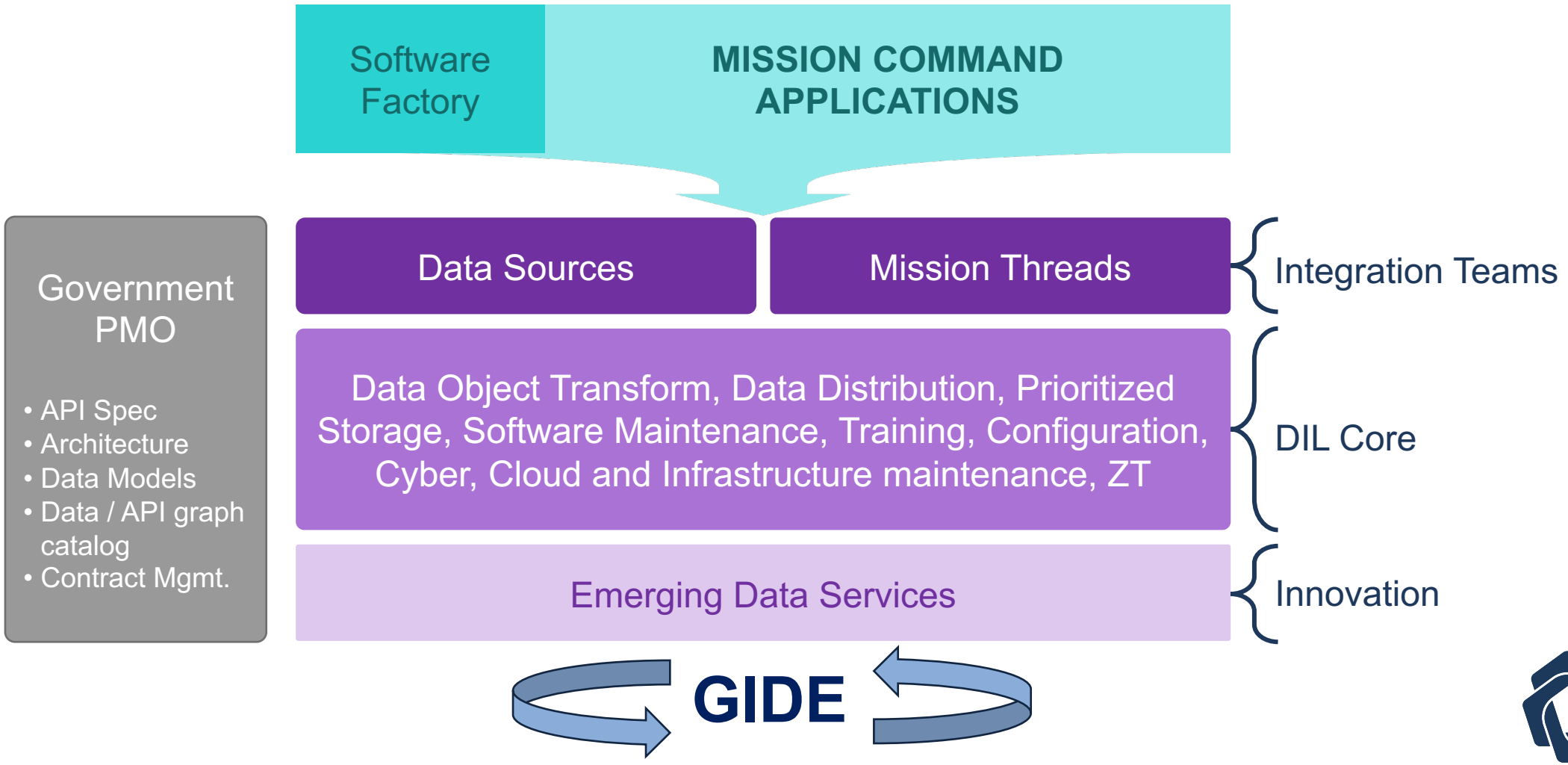

## Mission Command Applications
line of effort

**Pilot key user-facing applications, algorithms, analytics that support mission execution, and joint command and control**

**Create a software factory that will deploy user applications that harness joint data to empower US commanders**

**Set up contracting vehicles that enable partners and lower the barriers to entry for industry**

# Data Integration Layer: Essential Components



# The DIL Uses Data Mesh Principles

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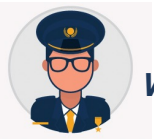
| | Domain-Oriented Ownership | Data-as-a-Product | Self-serve Data Platform | Federated Computational Governance |
|---|---|---|---|---|
| WHAT | *Example Domains:*<br>• Source Aligned(e.g., Service Platforms, etc.)<br>• Aggregate (e.g., CIP, COP, etc.)<br>• Consumer Aligned (e.g., ops, intel, logistics, etc.) | *Example Data Products:*<br>• Target Quality Tracks<br>• Blue Force Tracks<br>• Weapons Salvos<br>• Munition Availability | *Example Services:*<br>• API Registry<br>• Query/Search<br>• Pub/Sub<br>• Data Transforms<br>• Data Provenance<br>• CDS/MLS | *Example Governance:*<br>• Standards as code<br>• Policies as code<br>• Monitoring |
| HOW | • Conduct Mission Engineering Analysis to map Priority Mission Threads/Kill Chains to Data Domains<br>• Identify/establish relevant Domain Owners | • Identify product owners<br>• Make data accessible through APIs by:<br>  • Provide funding to Domain Owners<br>  • Provide resourcing/ engineering support<br>  • Go through PBR/Budget process to resource Domain related programs | • Develop prototype capability<br>• Incrementally deploy and validate | • Establish initial governance model and prototype "as code" capabilities as part of experimentation |

***Data Producers***

Application of the 4 data mesh principles will connect relevant data producers to data consumers and the Joint Warfighter

***Data Consumers***



***Joint Warfighter***



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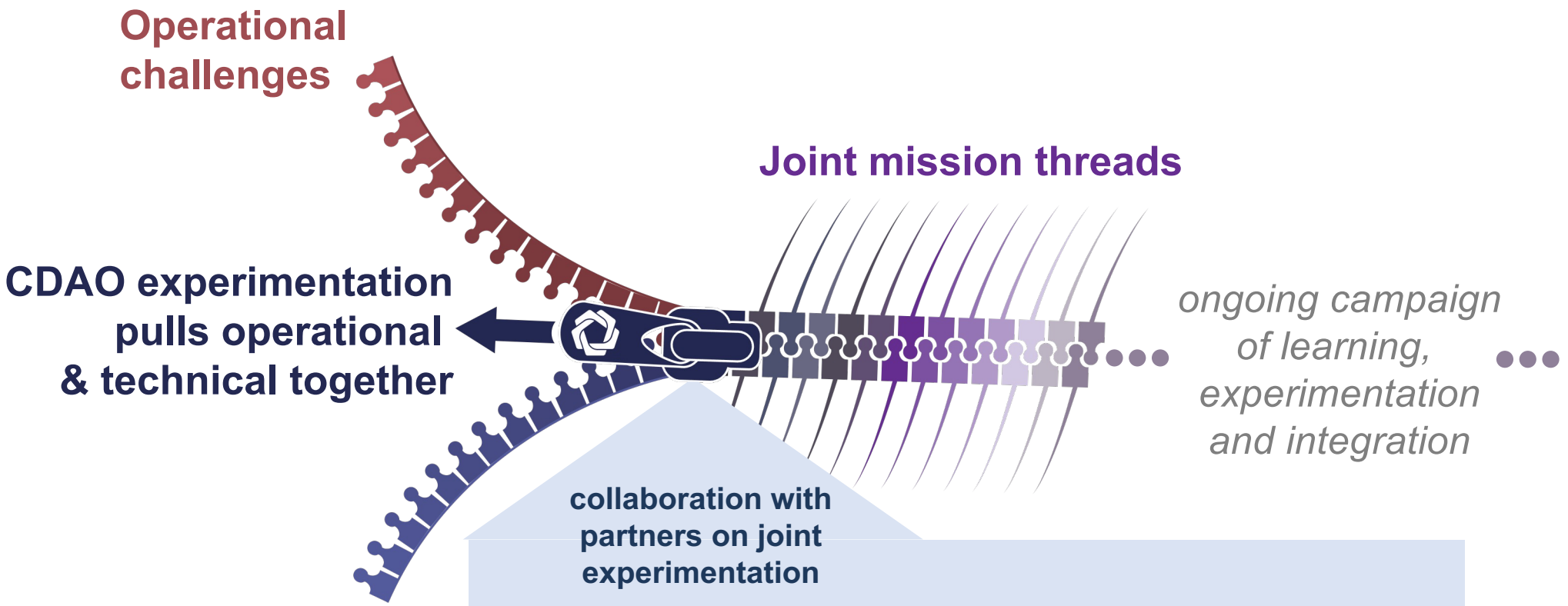
# Experimentation: Innovation at the intersection of technology and operations




**collaboration with partners on joint experimentation**

- Aligned around operational problems and operational hypotheses
- Sandbox for rapid iteration between technologies and warfighting, including means of C2
- New technology-enabled operational concepts
- Rigorous data collection and measurement promotes culture of learning
- Digital integration for new and improved mission threads

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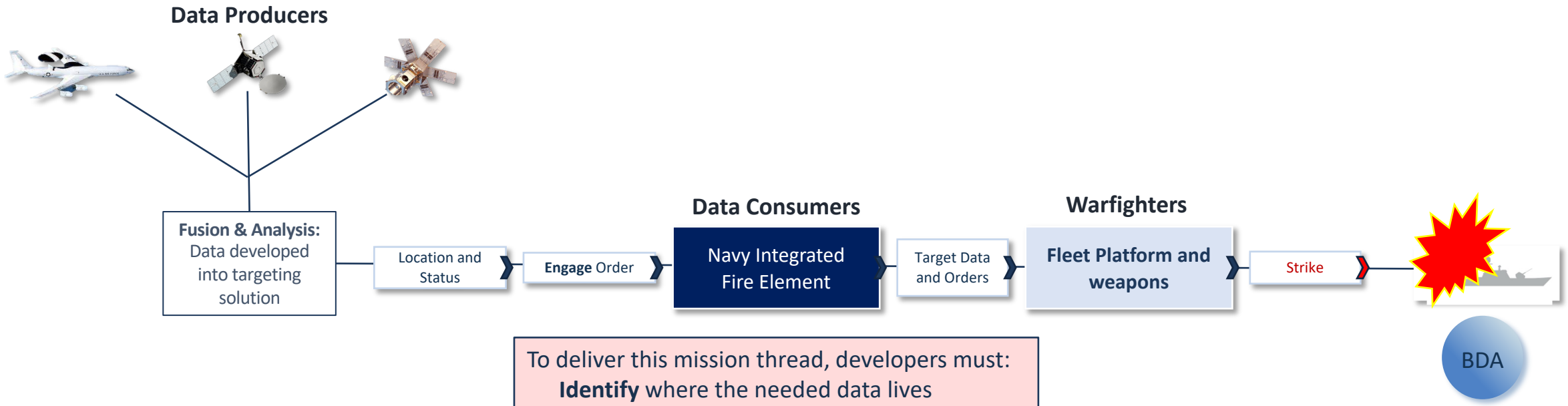
# TODAY: Long Range Precision Fires

**Challenge:** Data integration workflows are executed manually as point-to-point connections, with a single pipeline developed per data source, per application, per mission thread. This results in an exponential explosion of work and does not meet the pace, scale and complexity of the modern fires mission.


To deliver this mission thread, developers must:

- **Identify** where the needed data lives
- **Request** and receive access to the data
- **Ingest** multiple data feeds
- **Consume** the data into their application
- **Process** and transform the data as needed
- **Publish** application outputs to other apps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# Review: Three CJADC2 Lines of Effort

## Mission Command Applications

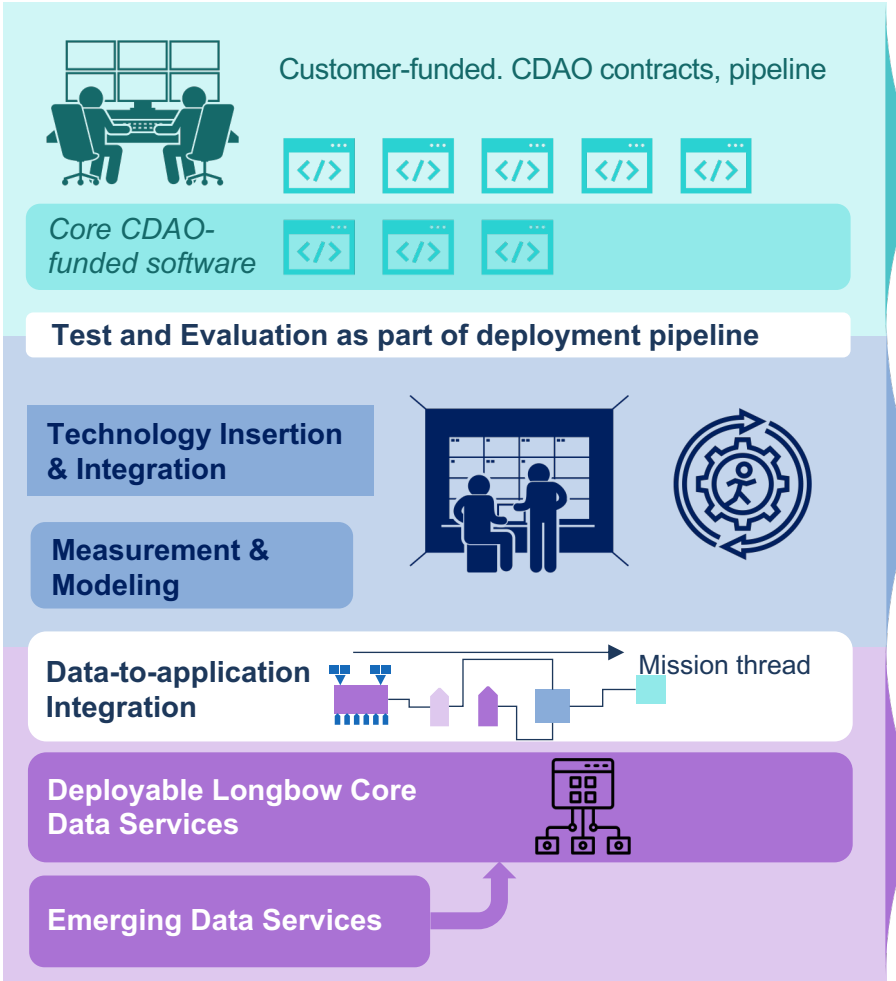
User-facing applications, algorithms, analytics that support mission execution, and joint command and control

## Experimentation

Hypothesis-based joint experimentation leveraging measurement, metrics, and models.

## Data Integration Layer

Expose and link the Department's data resources through evolving software and integration activity



# Industry Asks

What emerging capabilities can be used today in experimentation?

What additional functional capabilities do we need within the DIL?

What would allow for more rapid commercial software development?  How can we improve software onboarding?

How might this impact the software industry business model?

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