# Joint All-Domain Command and Control (JADC2)

## Opportunities on the horizon


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# Characteristics of Joint All-Domain Command and Control (JADC2)

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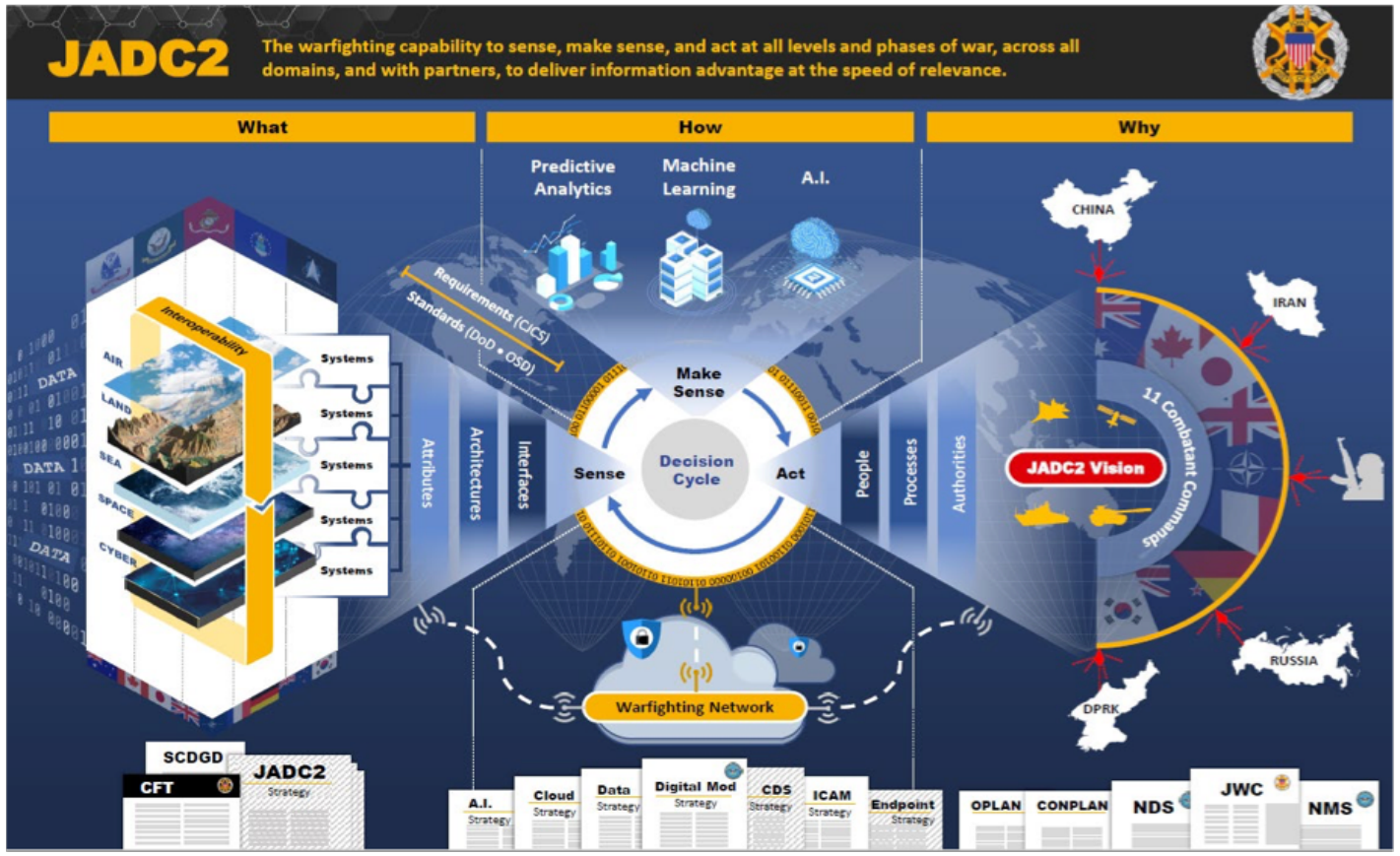
## Capabilities

- Connecting all sensors of C2, scaled information sharing
- Network based, cloud-like environment
- Data and interoperability standard driven
- Shared intelligence
- Secure and agile
- Resilient in degraded environment
- Unity of effort in capability development

## Issues raised

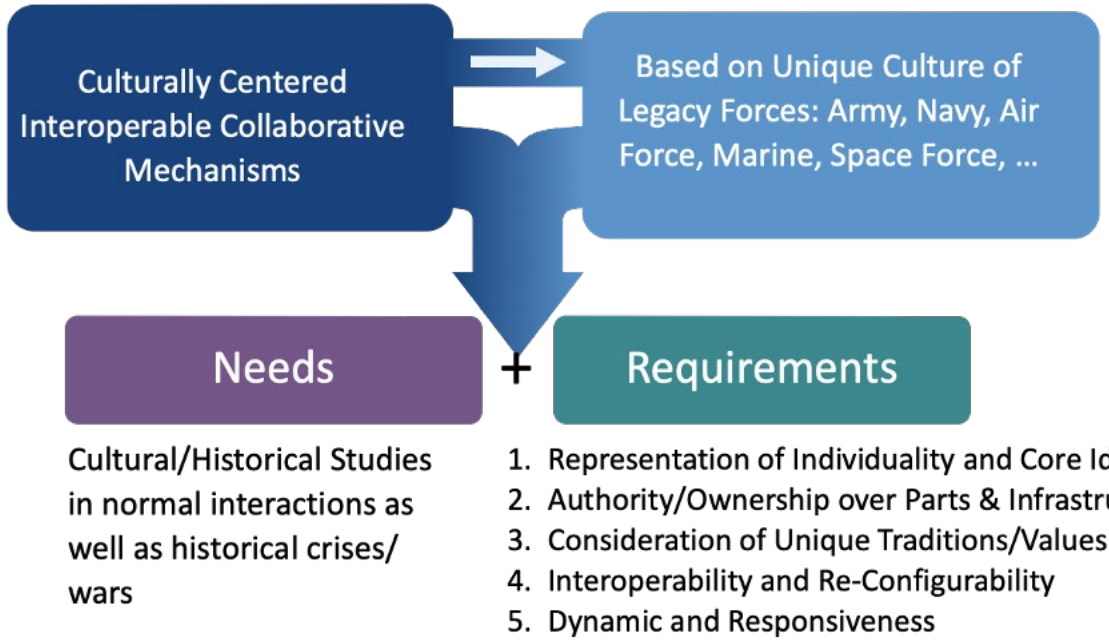
- Technical maturity of the proposed technologies
- Affordability and budget allocation
- Decision making authority across various domains
- Portfolio management needs




## Guiding principles

1. Information Sharing capability improvements are designed and scaled at the enterprise level
2. Joint Force C2 improvements employ layered security features
3. JADC2 data fabric consists of efficient, evolvable, and broadly applicable common data standards and architectures
4. Joint Force C2 must be resilient in degraded and contested electromagnetic environments
5. Department development and implementation processes must be unified to deliver more effective cross-domain capability options
6. Department development and implementation processes must execute at faster speeds.

# *Opportunity 1:* Create Novel, Culturally Centered Interoperable Collaborative Mechanisms between Services

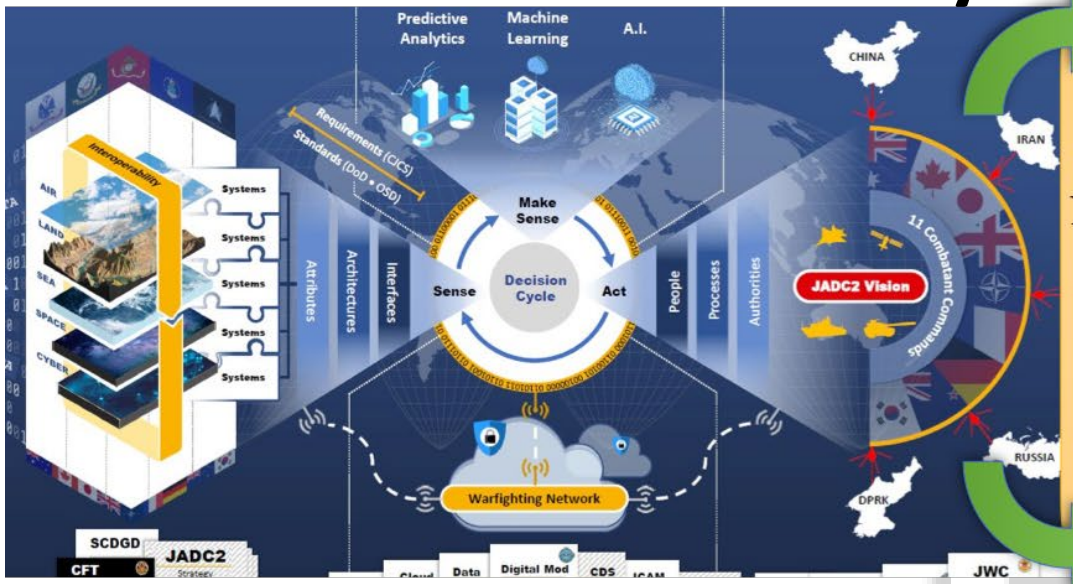



Academic Research: Organizational theory, Incentives to motivate jointness, organizational anthropology and psychology to find the best and unique jointness and collaboration architectures

- **Organizational research into cooperative structures**
  - Identity, historical and anthropology of values and traditions
  - Address *jointness* factors that cannot be solved by technology alone
- **Recognize unique legacy organizations**
  - Cultures, styles, security measures, etc.
  - Acknowledge individuality, organizational identities, unique traditions and values across various forces and departments
- **Minimize interdepartmental conflicts**

Invest in a unique, long-term, culturally informed solution of *jointness* that has dynamic **longevity**, versus limited, short-term "solutions" that don't solve core equities, roles, and functions

# *Opportunity 2:* Innovate Decision Analysis and Socio-Cultural Game Theory




**Decision making under uncertainty:** Need for new science of culturally-informed decision analysis and game theory involving irrational, inconsistent actors

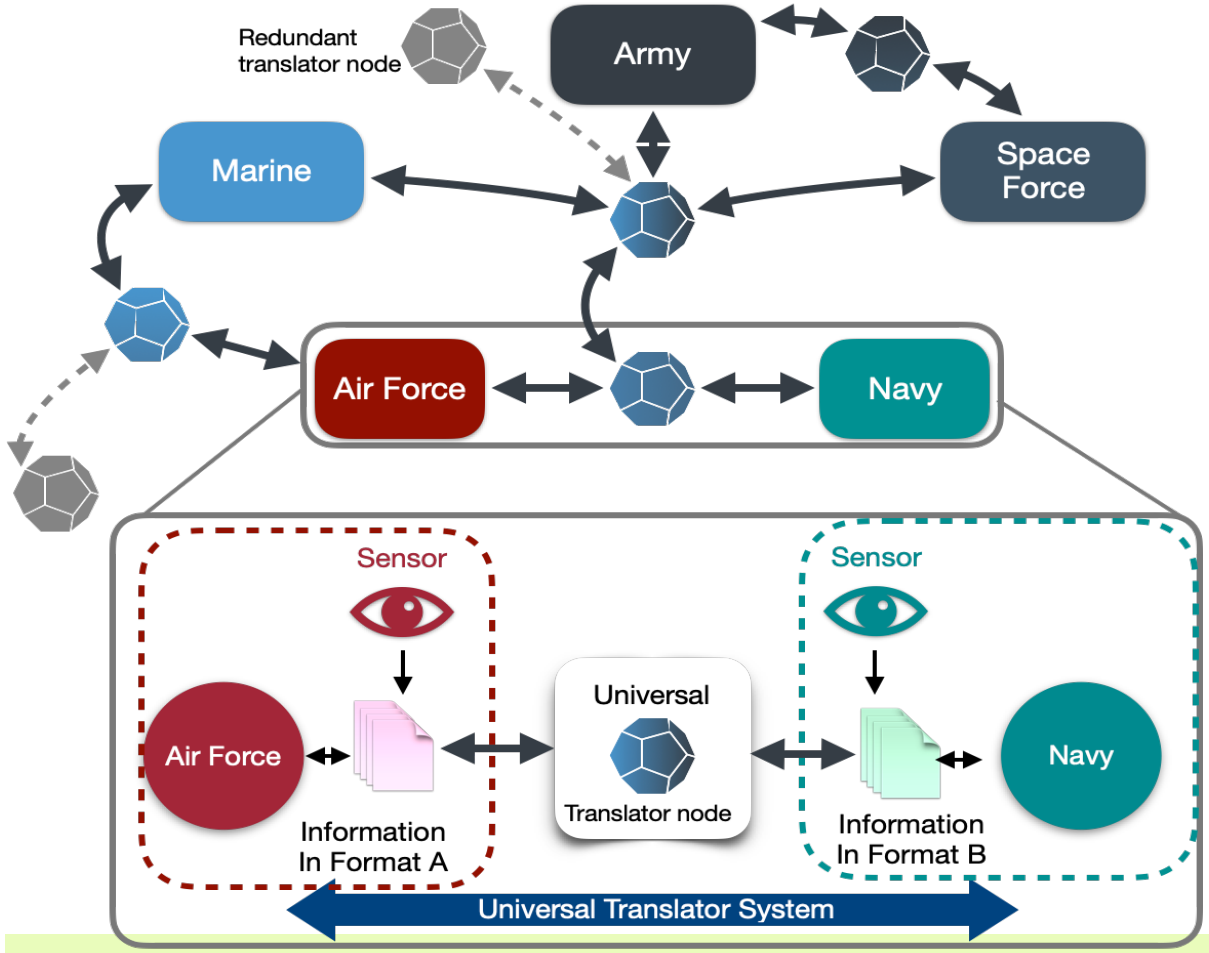
Adversaries
- May be irrational actors
- Different cultural and societal norms
- May have lack of consistency in behavior
- May have a different definition of ethics

Academic Research: New game theory and decision analysis methodologies that are modified based on irrational inconsistent actors.

- **Need new research in socio-cultural game theory**
  - Recognize irrational and inconsistent adversaries with different socio-cultural backgrounds
- **Identify cultural-specific blueprints of adversaries**
  - e.g., Sun Tzu (*The Art of War*)
- **Find best methodologies that account for cultural differences, values, and approaches**
  - Strategize based on these new insights

*Opportunity 3:*
# Universal Translator/ Rosetta Stone

***Complexity Management of Network of Interconnected Sensors, Decision Makers, and Shooters***



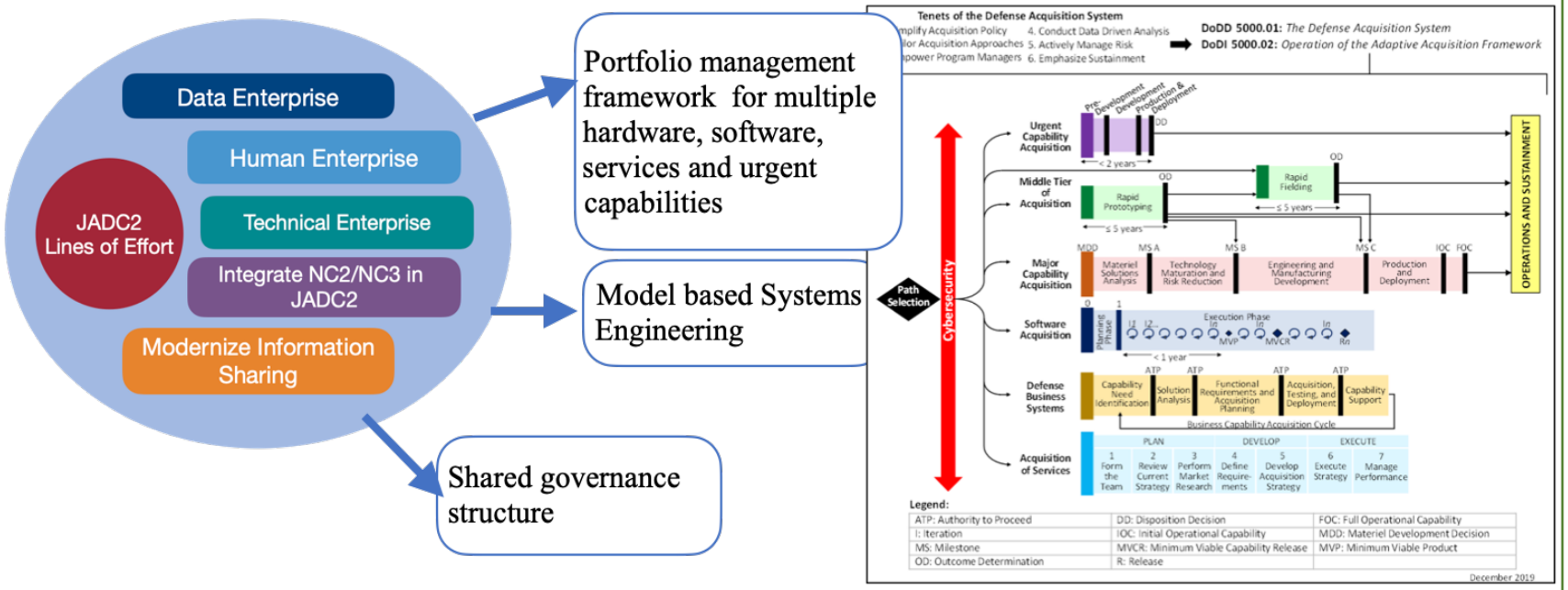

## Develop universal translator nodes

- **Compartmentalize federations**
  - Accommodates cultural differences (opportunity 1)
- **Allows firewalling of critical portions**
- **Enables flat organization with peer systems**
- **Reduces network complexity and risks of errors and vulnerabilities**

Academic Research: network complexity management, network security and firewalling mechanisms, federated collaborative networks (DARPA's Mosaic Warfare)

Invest on a federated complex networks that can preserve Service-specific functions yet interface seamlessly with joint functions and also operate independent from the rest of network if under attack. **Need for hardware + software universal translator infrastructures**

# *Opportunity 4:*
# Portfolio Management of JADC2 Acquisition Programs




- **System-of Systems and enterprise-level frameworks**
  - Manage, optimize, integrate, and fund as a portfolio of multiple projects and acquisition programs
- **Shared governance structure**

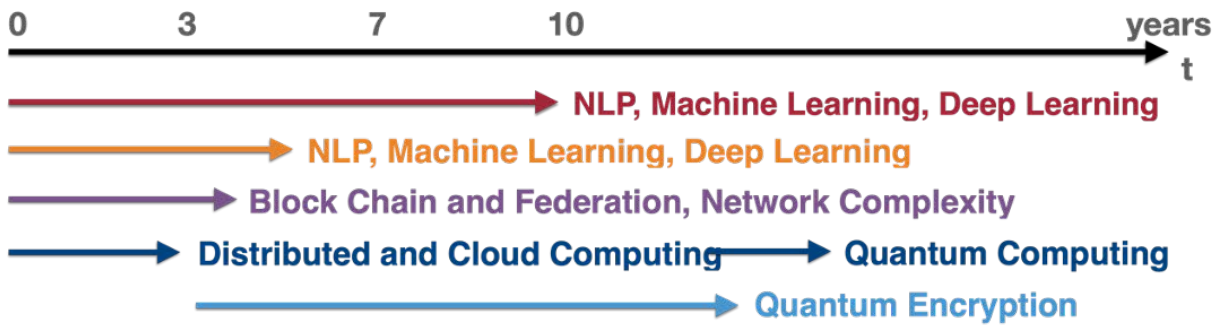
Academic Research: Portfolio management framework for multiple acquisition programs, Shared governance architecture

Invest in developing a portfolio management tool for multiple potentially asynchronous acquisition programs for JADC2

*Opportunity 5:*

# Requirements and MBSE for JADC2

- **Apply model-based systems engineering (MBSE)**
  - Materiel or non-materiel?
  - Utility and placement of universal translators (e.g., balance between unified platforms and shared elements)
  - Inform requirements setting: Joint or single service? Technologies, lifecycle management, upgrades, etc.
  - Guide acquisition process.
  - Address technical questions
    - When to apply new technologies; sensor networks designs and architectures; ConOps; etc.



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