



Joint Artificial Intelligence Center (JAIC) Medical Artificial Intelligence

May 2020



On the limits of Artificial Intelligence

“We tend to overestimate the effect of a technology in the short run and underestimate the effect in the long run”

-Roy Amara

AI Transformation is Key to DoD Modernization



Dr. Mark T. Esper
Secretary of Defense

Advances in AI have the potential to change the character of warfare for generations to come. Whichever nation harnesses AI first will have a decisive advantage on the battlefield for many, many years. We have to get there first.



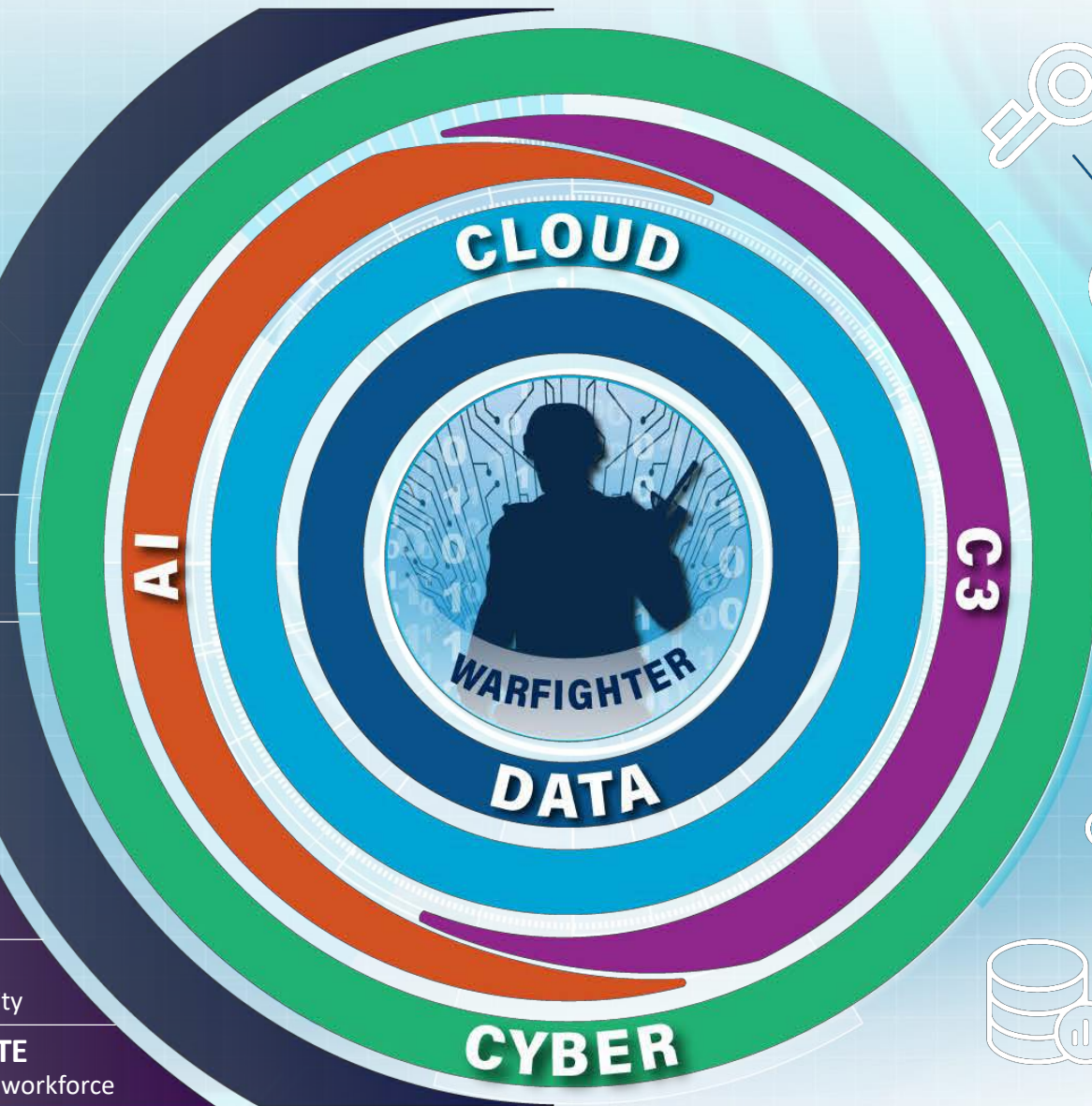
DIGITAL MODERNIZATION

LETHALITY
PARTNERSHIPS
REFORM

INNOVATE
for competitive advantage

OPTIMIZE
for efficiency and improved capability

CULTIVATE
for a ready workforce



CYBER
Dominance and security-first mindset will drive everything we design, build, and operate.



C3
Command, Control and Communications Modernization
Modernization is critical to Department and Warfighter mission assurance.



AI
Artificial Intelligence
A force multiplier and agent of transformation across all DoD functions – we will harness it smartly and at pace.



CLOUD
The foundation for all Key Focus Areas to unlock the full potential of technology advances for the Department and Warfighter.

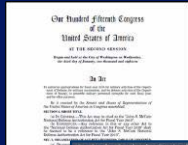


DATA
Strategically using data provides the Warfighter with information advantage.



AI Transformation is Key to DoD Modernization (Cont'd.)

Guidance Documents



FY 2019 National Defense Authorization Act (2018)



National Defense Strategy (2018)



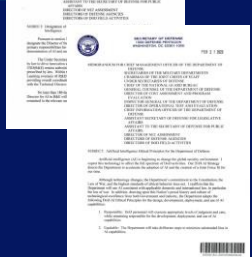
DoD AI Strategy (2018)



Executive Order on Maintaining American Leadership in AI (2019)



Designation of a Senior Official with Primary Responsibility for AI (2019)



Artificial Intelligence Ethical Principles for the Department of Defense (2020)

JAIC Milestones

- June 2018: JAIC Established
- January 2019: JAIC Director Assigned
- March 2019: JAIC Full Funding
- Summer 2019: First JAIC Deliveries
- March 2020: JAIC 2.0 – Realignment
- June 2020: JAIC Director Lt Gen Shanahan Retires (CTO Nand Mulchandani Serves as Acting Director Pending Confirmation of Three-star Director)

Creation of the JAIC

To fulfill the DoD mission to protect our nation, we must remain at the forefront of technological advances that ensure an enduring competitive military advantage against those who threaten our safety and security. AI is one such technological advance that will positively transform all aspects of the DoD by addressing global challenges.

The DoD's Joint Artificial Intelligence Center was established in 2018 to be the focal point of the DoD's AI Strategy to accelerate scaling AI and its impact across the Department. Working closely with the Services, Combatant Commands, and other Components, the JAIC identifies appropriate use cases for AI across DoD, rapidly pilots solutions, and scales impact across our enterprise.

We do this by identifying, integrating, developing, and fielding AI applications to more effectively and efficiently meet mission requirements, building an AI development environment that lowers technical barriers across the Department, and leading the DoD AI Enterprise's governance framework.

We create the conditions for thoughtful, responsible, human-centric AI adoption that supports and protects American service members, safeguards our citizens, defends our allies and partners, and improves effectiveness, affordability, tempo, and agility of DoD operations.



JAIC Strategic Framework

JAIC Mission Statement:

Accelerate DoD's adoption and integration of AI to achieve mission impact at scale

JAIC Vision Statement:

Transform the DoD through AI

JAIC Core Objectives:

- **Deliver** AI-enabled capabilities that address key missions
- **Scale** AI's impact across DoD through a common foundation that enables decentralized development and experimentation
- **Cultivate** a leading AI workforce
- **Engage** with industry, academia, and international partners
- **Lead** in military ethics and AI safety

JAIC 1.0 to Today

June 2018

- People
 - 4 Government
- Funding
 - FY19: \$89M in two tranches (Dec 2018, March 2019)
- Facilities
 - Two spaces @ Pentagon; some offices in Mark Center
 - Capacity: 11

Spring 2020

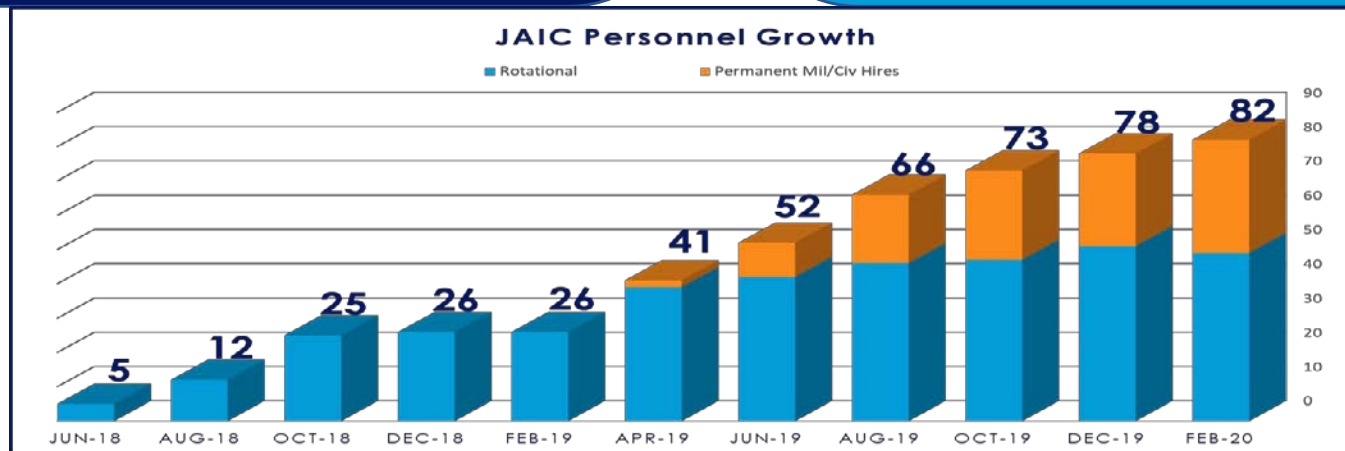
- People
 - 75 Government (59 Civilians/16 Military)
 - Growth to 158 Government in FY21
- Funding
 - \$243M (\$184M RDT&E, \$59M O&M)
- Facilities
 - Pentagon, Crystal Gateway 2, Suffolk Building
 - Capacity: 11 Pentagon; 109 CG2; ~175 Suffolk Building
(start move in late spring 2020)



Crystal Gateway 2






Suffolk Building



JAIC 1.0 to Today

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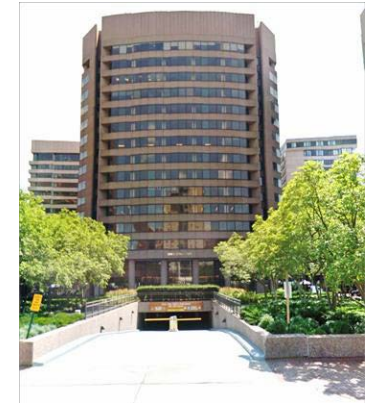
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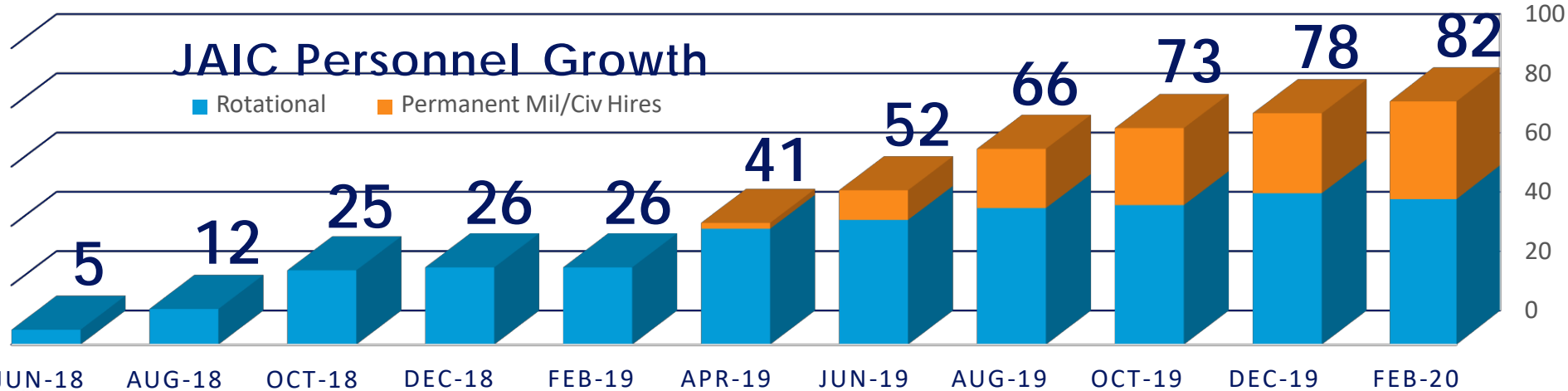
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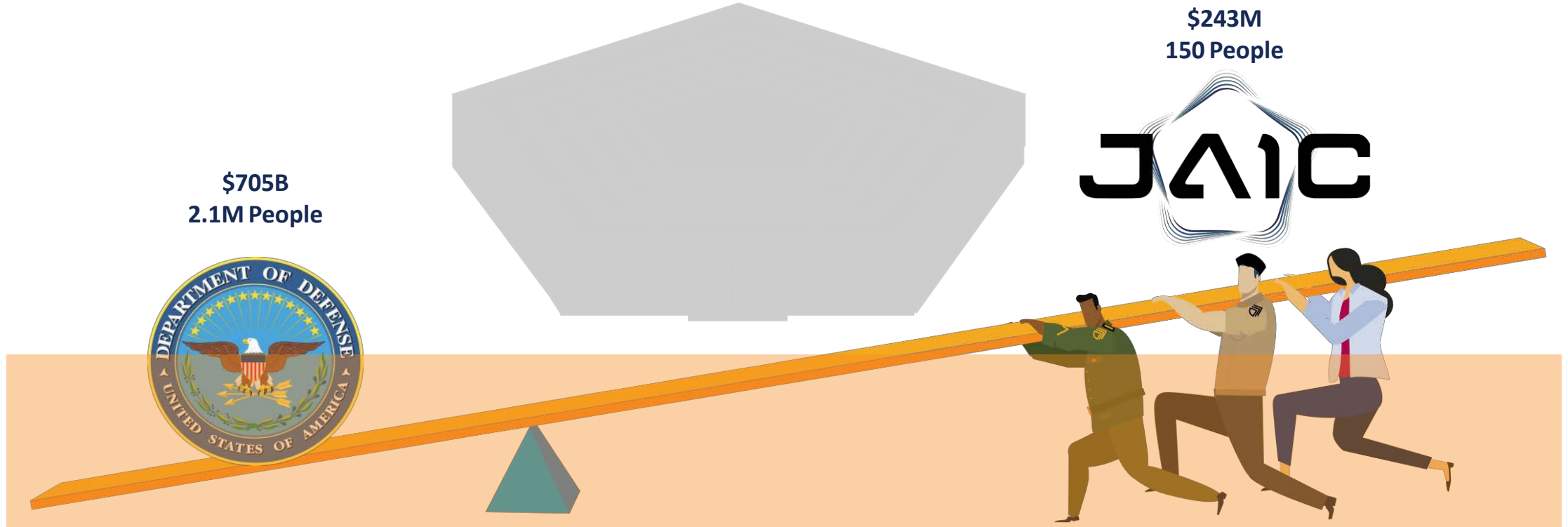
Crystal Gateway 2



Suffolk Building



Leveraging JAIC to Transform the DoD



JAIC's strategy is to help the DoD leverage the game-changing power of AI by providing the specialized expertise to deliver products, create platforms, and build relationships with industry

JAIC 2.0: AI Business Model

**Operationalize
Lessons Learned:**
Pave the foundation for
the future

**Leverage AI to
Drive Scale:**
Every deliverable is a
repeatable product

**Catalyze Long-Term Change
Through AI:**
Deter adversaries and when
deterrence fails, win the wars of
the future

Missions
Find patterns in
customer
needs, create
common
solutions;
learn from
mistakes

Acquisition
Identify AI-
specific
contracts with
data and
IP rights

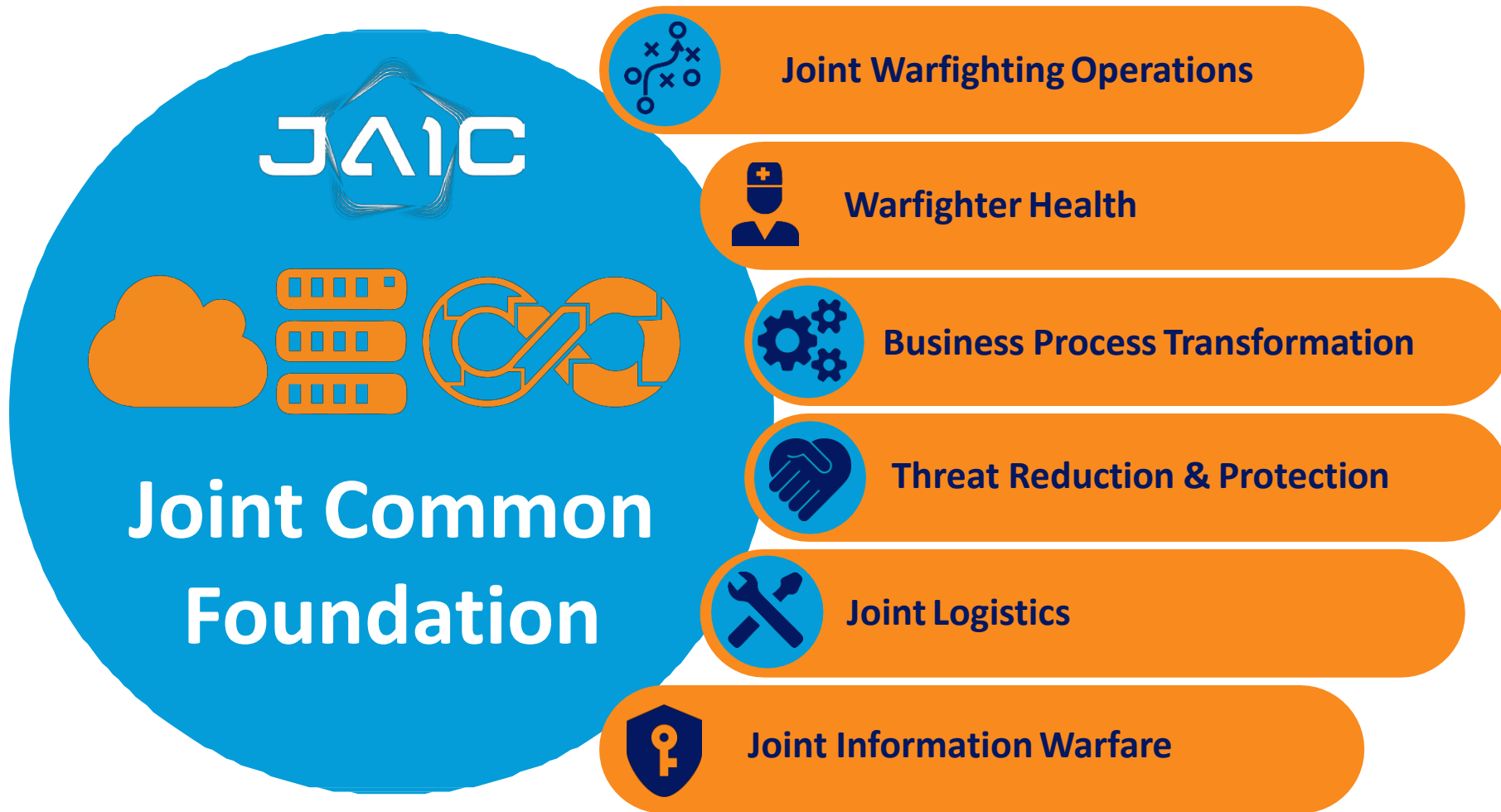
Policy
Drive
consistency
through
ethics, policy,
and
international
engagement

Products
Develop AI
platforms, not
apps, that can
be rapidly
transitioned to
production

HR
Employ best
practices in AI
recruiting,
hiring,
retention, and
compensation

**Education &
Training**
Enhance skills
segmentation
by delivering AI
training and
education at
scale

JAIC Mission Initiatives (MI)



Warfighter Health

Why this MI? Currently, health records and medical images are updated and reviewed individually, neglecting population-level inferences. Treatment is often hampered by slow medical logistics that absorb manpower, clog supply lines, and overwhelm available medical personnel. Efforts under this MI have proved that the potential to reduce disability determination processes from years to months is within reach, and initial estimates point to DoD savings of \$7.5B over the FYDP.

Goals: Apply AI to the vast amount of health data recorded by the DoD to find breakthrough results in curing diseases, increase operational readiness, and decrease healthcare costs while improving outcomes.

- Identify and mitigate our warfighters' most pressing health needs
- Decrease health care provision timelines for our warfighters
- Increase operational effectiveness through improved warfighter health
- Apply lessons learned from COVID-19 to improve future projects

Products:

- **Suicide Intervention and Prevention:** Risk Mitigation Dashboard that highlights warfighter counter-productive behavior and recommends mitigations
- **Medical Imaging:** Supervised Deep Learning model on Augmented Reality Microscope to augment pathology detection
- **Health Records Analysis:** ML-based predictive model that flags personnel for evaluation and provides decision support for intervention and treatment
- **Point-of-Injury:** Series of AI models to enhance DoD's ability to prevent, identify, and treat issues that impact force readiness



Success Story:

Since fall 2019, we developed and demonstrated a predictive analytics capability. The next phase of development will expand functional disability coding to Air Force, Navy, Marine Corps, and Coast Guard in a dynamic data set and pilot the capability before scaling across DoD. Additionally, we are building infrastructure (*Health E Intent, MHS Genesis, Individual Electronic Health Record*) to support continued innovation and future data capture for nationwide health.

WARFIGHTER HEALTH – Product Line Highlights

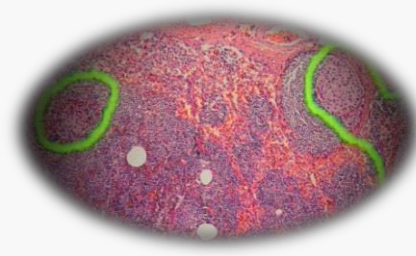
Health Records Analysis



Today: Manual, labor-intensive searching and classification of service members

Records classification Goal: *accelerate readiness determinations to allow medical providers more time with patients*

Medical Imaging Classification



Today: Tissue samples are individually, manually analyzed. The world's largest sample remains inaccessible for deeper analysis

Image classification Goal: *accelerate, improve individual diagnoses and enable population-wide inferences*

Suicide Intervention & Prevention



Today: At-risk service members and veterans are not identified for treatment and are committing suicide or performing poorly

Behavior analytics Goal: *Identify validated indicators of illness or injuries to recommend early and accurate treatment*

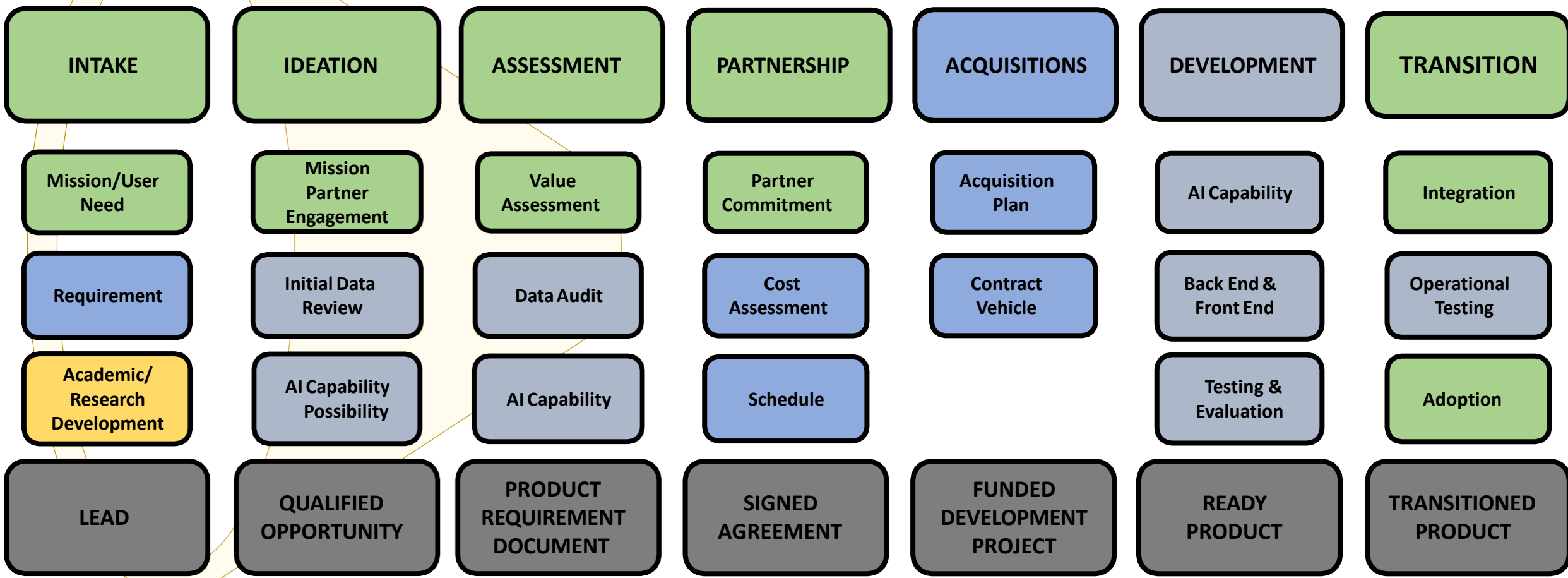
Point of Injury Treatment Support



Today: Battlefield conditions create uncertainty and patient volumes that degrade triage

Virtual assistance Goal: *Improve sensor integration and recommend actions to emergency responders*

Warfighter Health Lead Breakdown



25 Leads

10 Opportunities

7 PRDs
3 "light PRDs"

4 Agreements

7 Funded Products

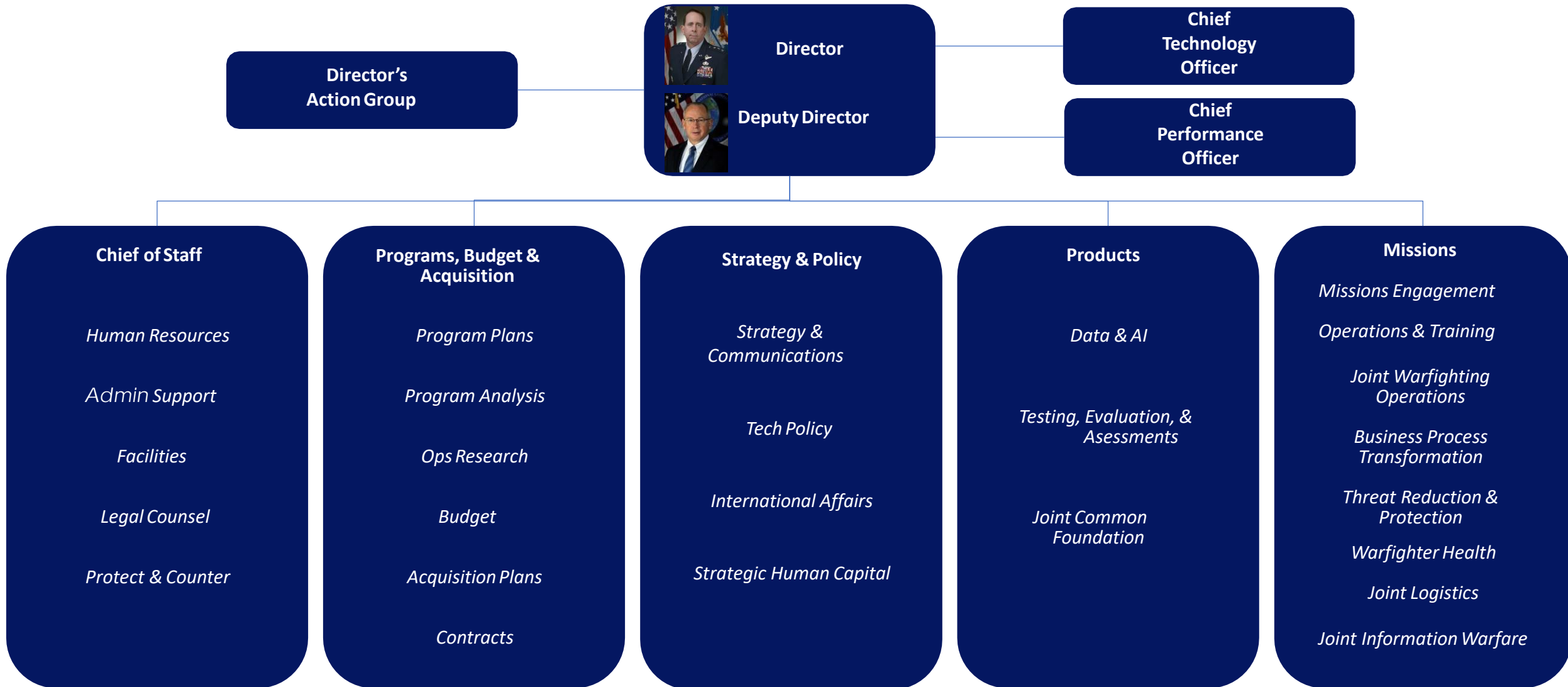
2 Ready Products (prototype)

Transitioned Products



JAIC Backup Slides

JAIC Organization



JAIIC

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LinkedIn: <https://www.linkedin.com/company/dod-joint-artificial-intelligence-center/>

