



# AI Fuels Smarter Medical Imaging and Better Outcomes

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# JAIC Mission Initiatives

## Warfighter Health

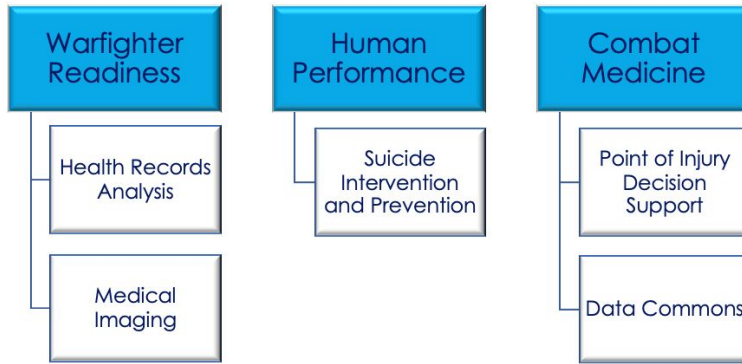
# The Joint Artificial Intelligence Center



# Warfighter Health (WH)

**Why this MI?** Service members' health is critical to national security, directly affecting the force's readiness and effectiveness. The Department spends nearly \$50B annually on the Military Health System (MHS). Military health records provide medical data on a large and diverse population over long periods of time, which is rare and valuable when compared to other population U.S. medical datasets.

**Goals:** Use AI to Identify and mitigate pressing health challenges facing our warfighters; dramatically decrease timelines for providing health care and services; and increase operational effectiveness through improved warfighter health.



## Success Story:

Since fall 2019, Warfighter Health developed and demonstrated a predictive analytics capability that will expand functional disability coding to Air Force, Navy, Marine Corps, and Coast Guard in a dynamic data set. The next phase will pilot the capability before scaling across DoD. Additionally, Warfighter Health is building an electronic infrastructure to address health data disparities and support continued innovation in data-driven military medicine capabilities

# Opportunity to Improve Cancer Outcomes Using AI



## Growing Cancer Burden

Cancer diagnosis and treatment costs DHA ~\$1.7B annually.

Central medical programs are **fastest growing DoD support function cost.**



## Better diagnostics needed

Earlier and more accurate diagnosis can improve cancer outcomes, but the availability of specialists is **decreasing over time.**



## AI tools show great promise

Recent advances in deep learning have shown great potential to improve cancer diagnosis, but **real-world deployments of this technology remain limited.**

# Predictive Health Program

In collaboration with the **Defense Innovation Unit** and the **Defense Health Agency**, in early 2020 the JAIC funded a solicitation for innovative solutions to enable integration of AI into pathology and radiology workflows

Google Cloud was selected to **prototype a novel AI-enabled digital pathology** solution at select DoD and VA treatment facilities



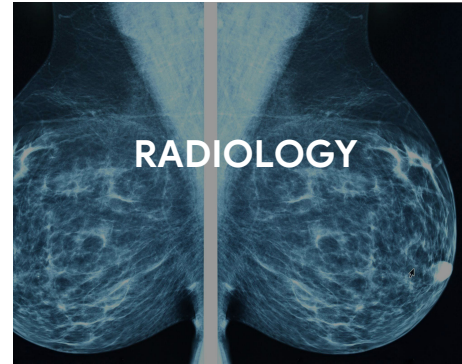
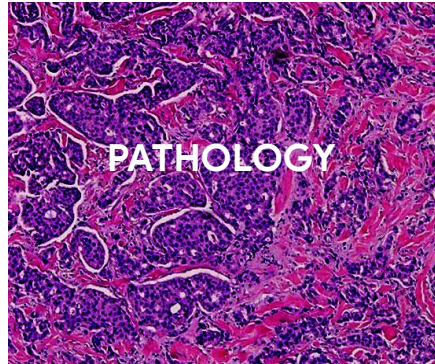
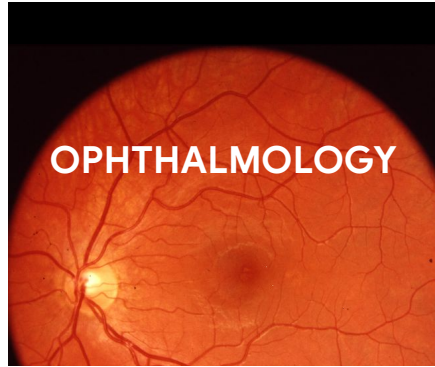


# Solutions Overview

Deploying Google AI to DoD

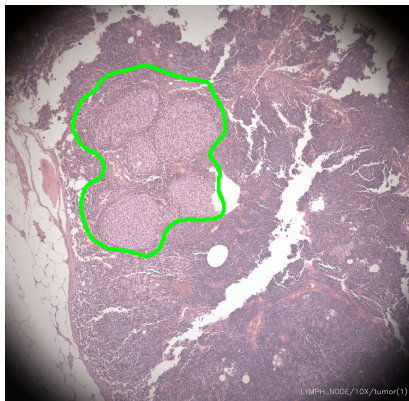


# Improving the Accuracy and Availability of Diagnosis



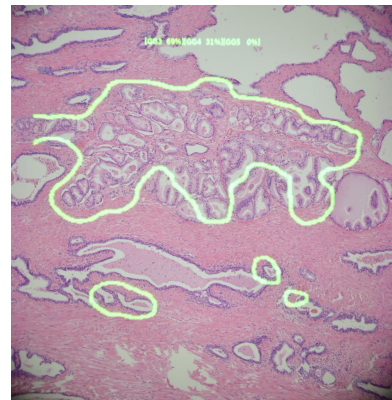
# Expert level accuracy at diagnosing pathology slides

Identifying breast cancer metastasis in lymph nodes



*Liu et al Arch Pathol Lab Med (2019)\**

Detecting and grading prostate cancer

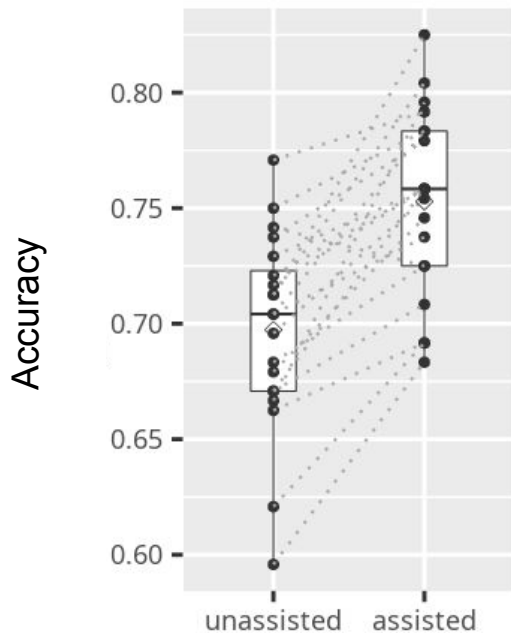


*Nagpal et al JAMA Oncology (2020)\**

\* Research performed under a CRADA with the Naval Medical Center San Diego

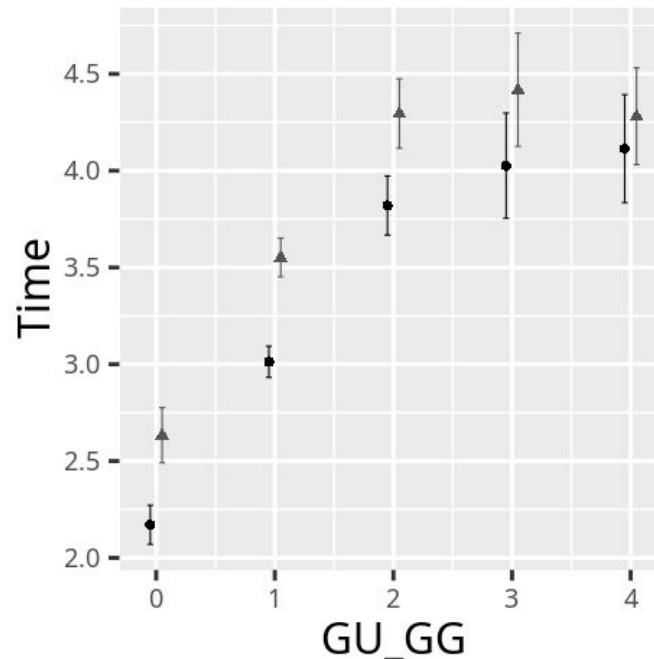
# AI can improve the **accuracy** and **efficiency** of pathologists

Accuracy all cases



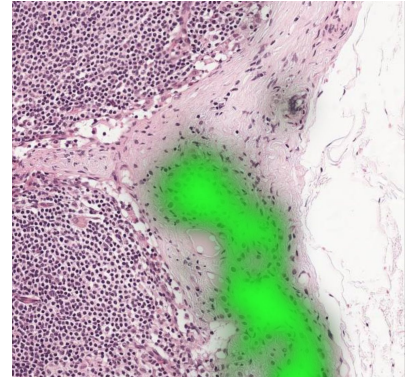
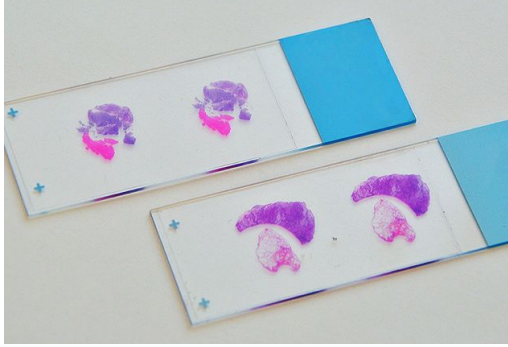
Average accuracy for each pathologists is represented by a black circle

Review time per case



Average time savings of 30s (12%) per biopsy

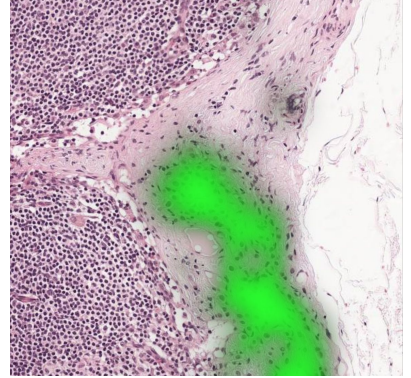
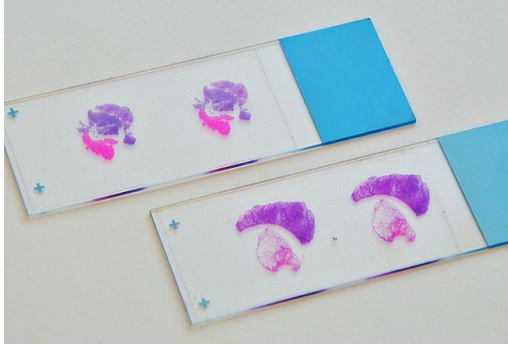
# How do we deploy this technology to military pathologists?



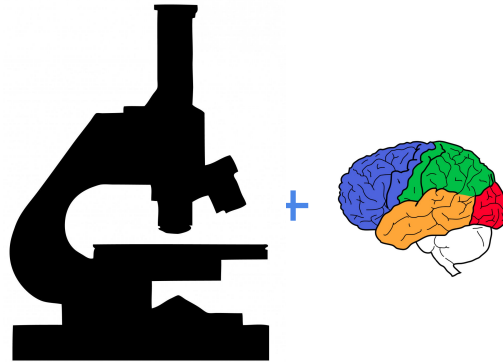
## Adoption barriers for digital pathology

- Expensive scanners
- IT infrastructure required
- Disrupts existing workflows
- Not all clinical needs addressed (speed, focus, etc)

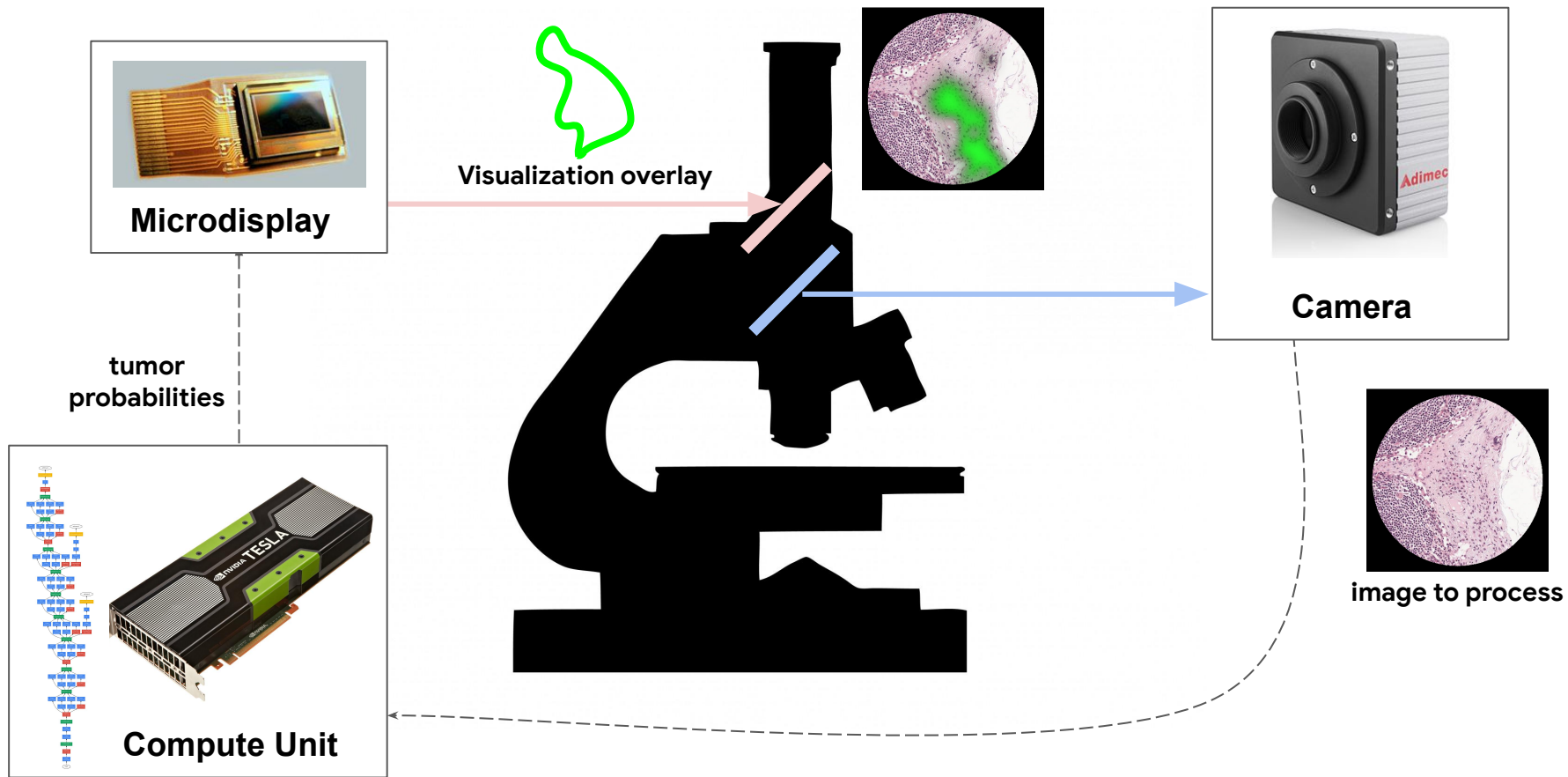
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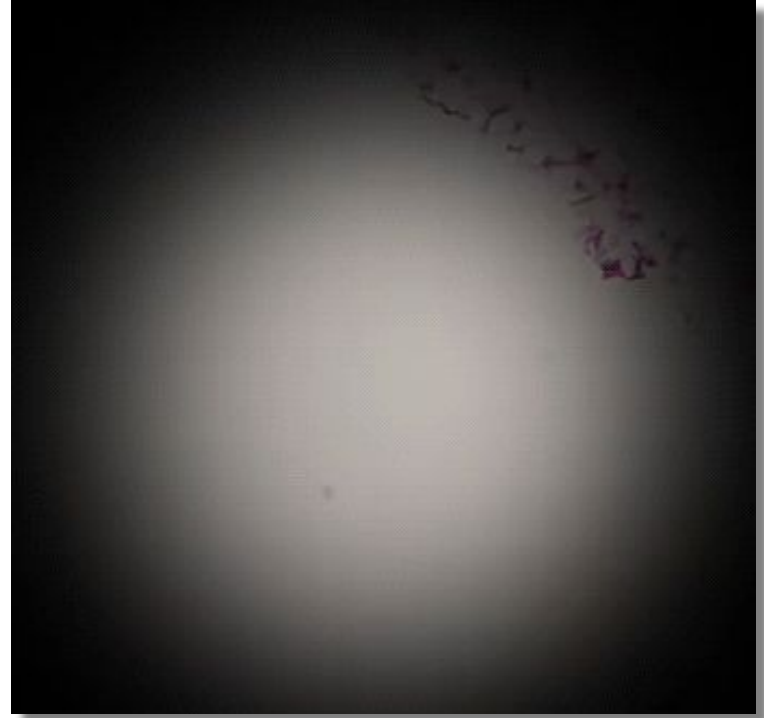
Solution:  
*Bring AI into the microscope*



# The Augmented Reality Microscope



# The Augmented Reality Microscope



# Program Objectives



## Deploy microscopes

**Install 10 augmented reality microscopes** at military treatment facilities.

Will be loaded with existing prostate and lymph node metastasis models.



## Develop 2 new AI models

In collaboration with JAIC and DIU, Google Cloud will train **2 new AI models** using de-identified DoD pathology images and deploy to the microscopes.



## Demonstrate path to scale

Google will demonstrate **Cloud based infrastructure** that will allow DoD to independently **train and deploy additional medical AI capabilities in the future.**



# Thank you

