

# Importance of other Federal Agencies in the QIS Ecosystem

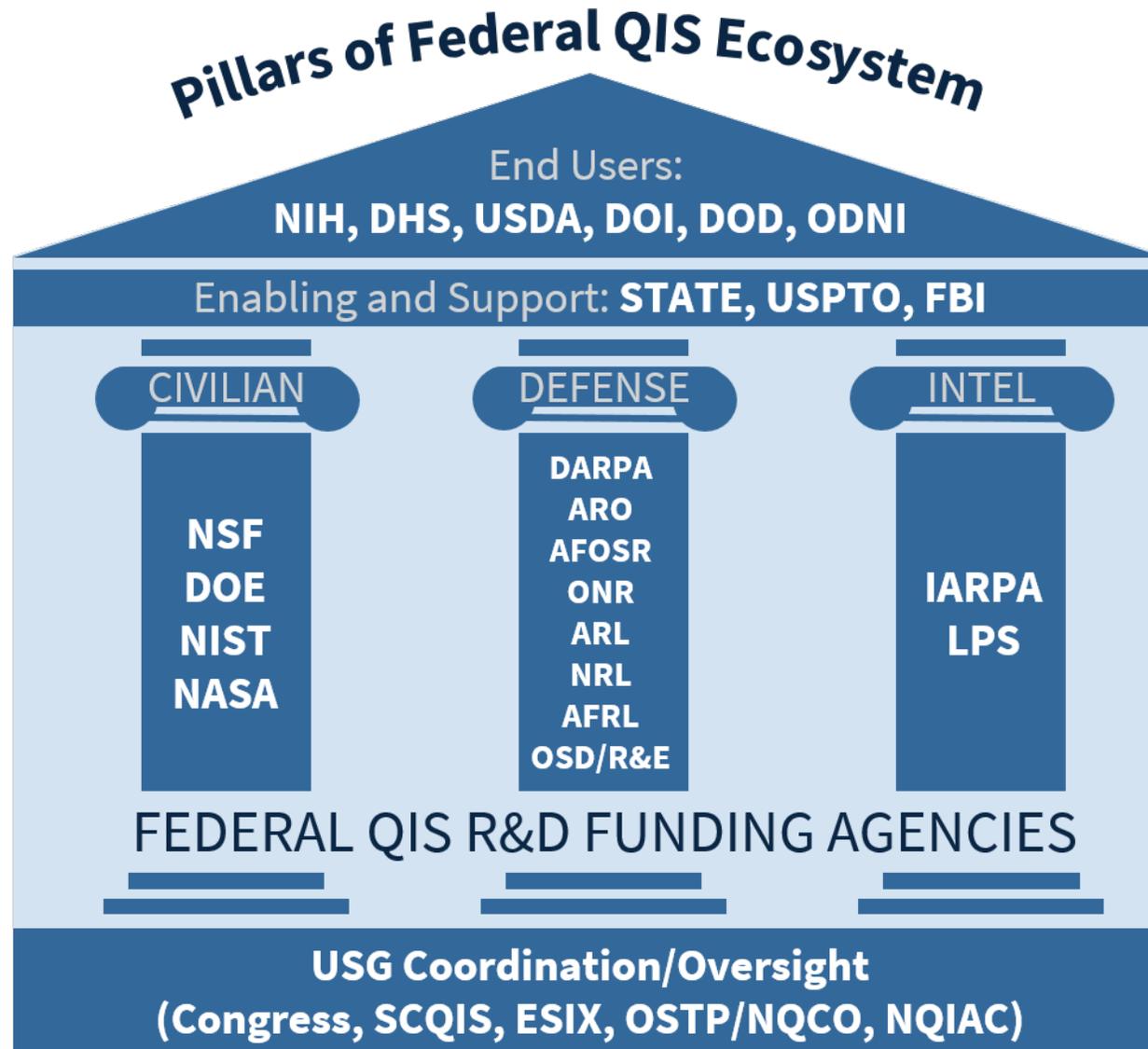
Dr. Corey Stambaugh  
National Quantum Coordination Office  
10/27/2020

Office of Science and  
Technology Policy

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# Federal Agencies in the QIS Ecosystem



## CIVILIAN

- National Science Foundation (NSF)
- Department of Energy (DOE)
- National Institute of Standards and Technology (NIST)
- National Aeronautics and Space Administration (NASA)

## DEFENSE

- Defense Advanced Research Projects Agency (DARPA)
- Army Research Office (ARO)
- Air Force Office of Scientific Research (AFOSR)
- Office of Naval Research (ONR)
- Army Research Lab (ARL)
- Naval Research Lab (NRL)
- Air Force Research Lab (ARFL)
- Office of the Secretary of Defense/Research and Engineering (OSD/R&E)

## INTELLIGENCE

- Intelligence Advanced Research Projects Activity (IARPA)
- Laboratory For Physical Sciences (LPS)

## END USERS

- National Institutes of Health (NIH)
- Department of Homeland Security (DHS)
- United States Department of Agriculture (USDA)
- United States Geological Survey (DOI/USGS)
- Department of Defense (DOD)
- Office of the Director of National Intelligence (ODNI)

## ENALBING AND SUPPORT

- Federal Bureau of Investigation (FBI)
- U.S. Patent and Trade Office (USPTO)
- Department of State (STATE)



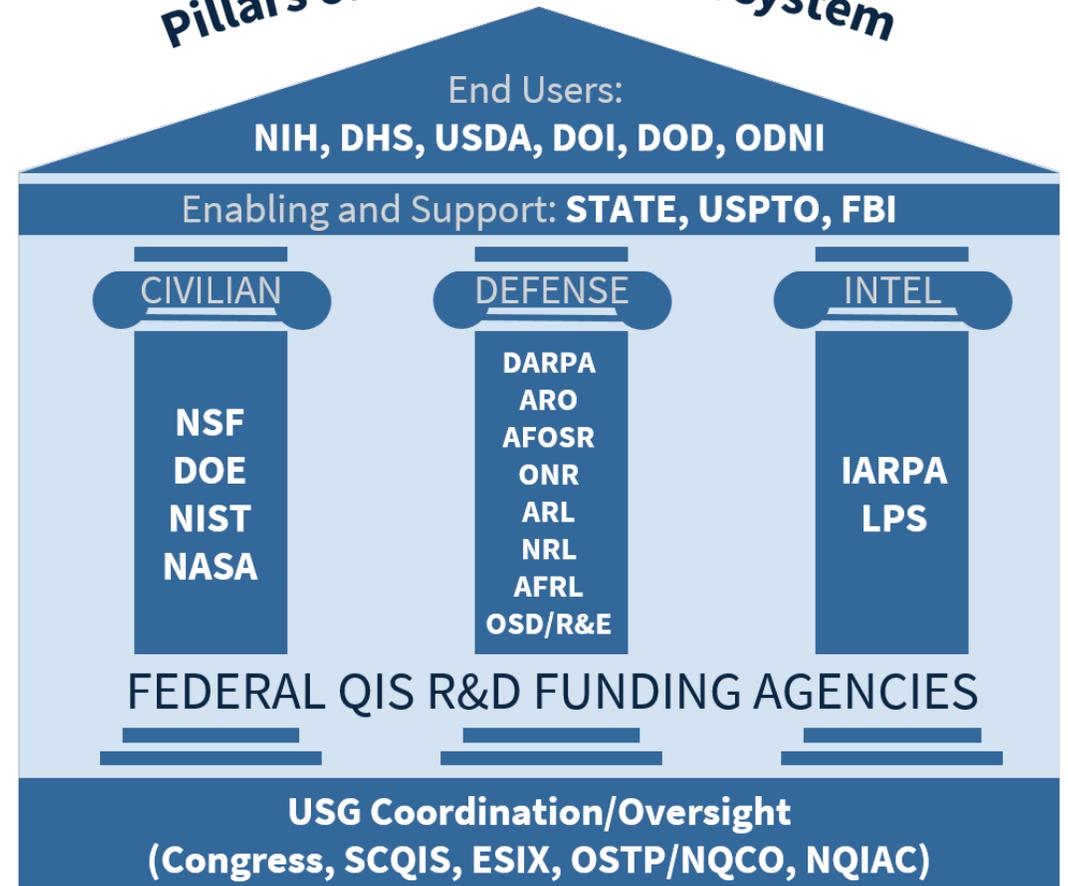
# DOD and IC Funding of QIS

**The Department of Defense's research, technology, and engineering investments strategic heading is set by USD (R&E).**

- Quantum Science is one of DoD's 11 top modernization priority areas.
- In a 2018, the position of Principle Director of Quantum Science was created within Office of the Under Secretary of Defense for Research And Engineering (OUSD/R&E).
  - This position is currently held by Dr. Paul Lopata.

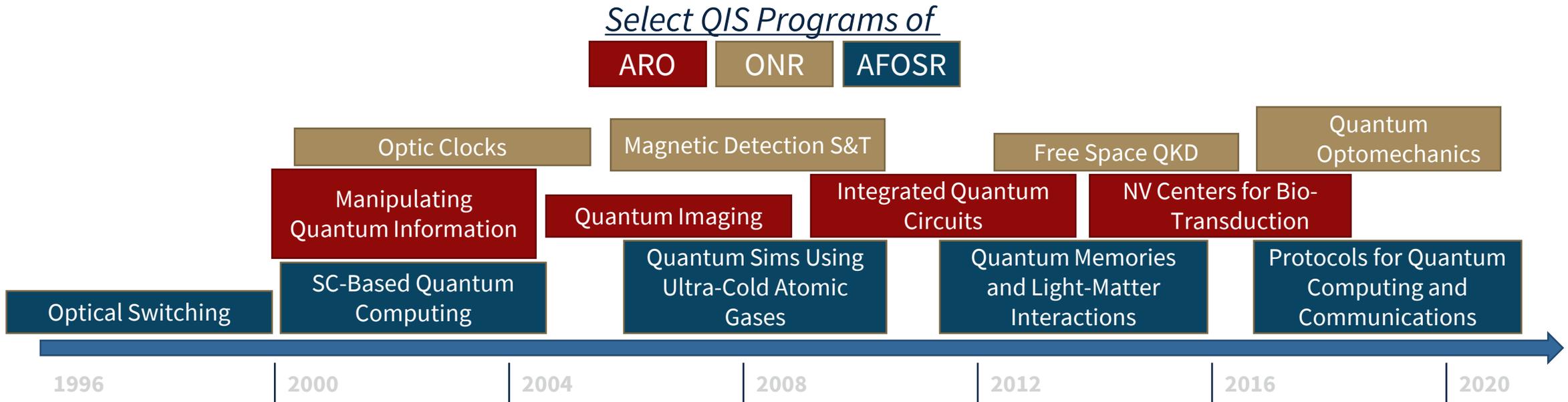
**In parallel, the Intelligence Community has played a critical role in developing QIS over the past 3 decades, and has showed sustained commitment to the technology.**

## Pillars of Federal QIS Ecosystem



# ARO, ONR, and AFOSR

*The Research Offices of the Army, Navy, and Air Force primarily fund systematic studies directed toward greater knowledge or understanding of the fundamental aspects of phenomena and of observable facts without specific applications towards processes or products in mind*



**The above timeline represent just a portion of the more than 4 dozen MURI programs that stretch across quantum information, sensing, timing and supporting technologies, as well ARO, ONR, and AFOSR.**



# Army, Navy, and Air Force Labs

Innovare Advancement Center Launches with ‘\$1,000,000 International Quantum U Tech Accelerator’ Led by Air Force Research Laboratory Information Directorate, Griffiss Institute, Oneida County & State University of New York



## WRIGHT-PATTERSON AFB

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### Air Force awards \$5.25 million to accelerate Quantum enabling technologies

By Air Force Research Laboratory Public Affairs / Published June 29, 2020



## News Releases

FROM THE U.S. NAVAL RESEARCH LABORATORY

News Releases Videos Comment Policy

### NRL Designated Navy's Quantum Information Research Center

By Paul Cage, U.S. Naval Research Laboratory, Corporate Communications | September 28, 2020

WASHINGTON – In March of this year, the Department of the Navy designated the U.S. Naval Research Laboratory as the Navy's Quantum Information Research Center.



## News Releases

FROM THE U.S. NAVAL RESEARCH LABORATORY

News Releases Videos Comment Policy

### NRL, Maryland Virtually Sign Partnership on Quantum Technologies

By Paul Cage, U.S. Naval Research Laboratory Corporate Communications | September 1, 2020

WASHINGTON — Although COVID-19 has disrupted business around the world for many organizations, it doesn't mean that all work stops. U.S. Naval Research Laboratory and the University of Maryland's Quantum Technology Center (QTC) the two organizations entered into an Educational to quantum technologies research Sept. 1. Quantum technologies and understanding the science that



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# DARPA and IARPA

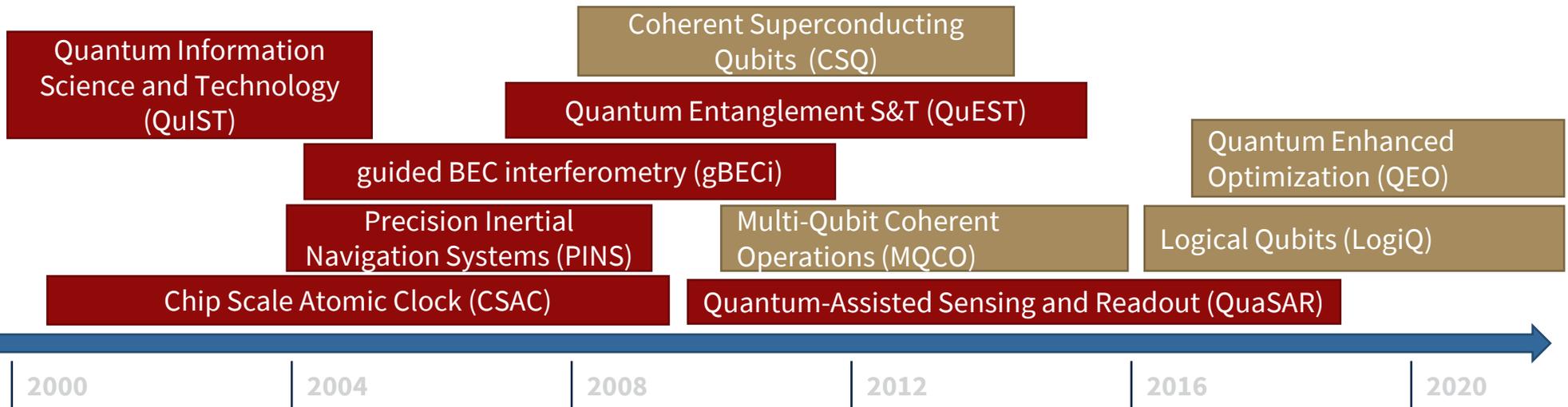
*DARPA's mission is to make pivotal investments in breakthrough technologies for national security.*

*IARPA's mission is to envision and lead high-risk, high-payoff research that delivers innovative technology for future overwhelming intelligence advantage.*

## Select QIS Programs of

DARPA

IARPA



**The above timeline represent just a portion of the more than 3 dozen R&D programs that stretch across quantum information, sensing, timing and supporting technologies.**

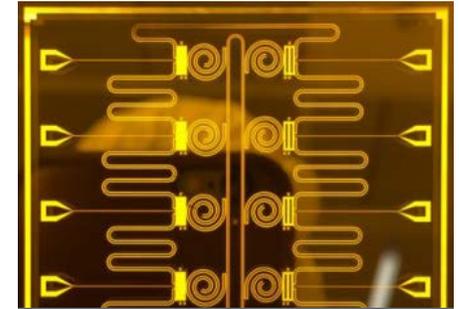
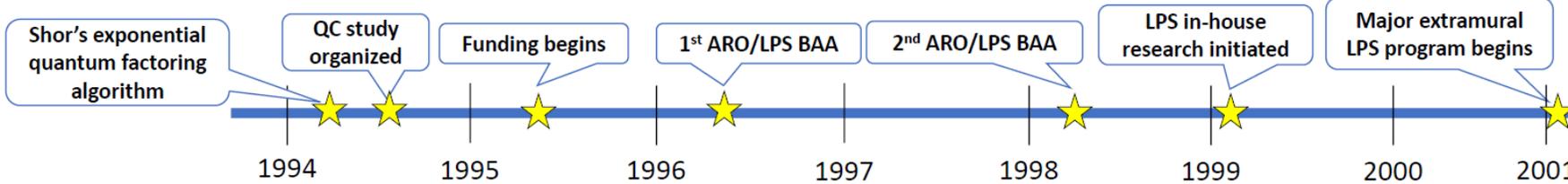


# LPS

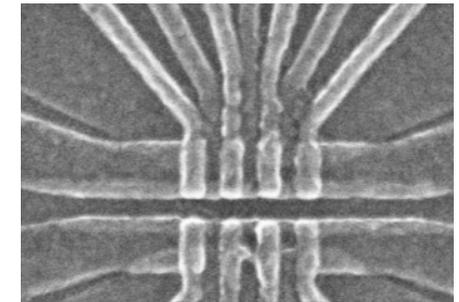
***The mission of the Research Directorate is to conduct world-class scientific research with the objective of developing new and innovative techniques to support and enable the Agency mission, as well as those of the IC/DOD/USG.***

- LPS has both internal and externally-funded research in QIS.
- Advance the state-of-the-art in qubit devices, multi-qubit quantum control, enabling technologies and related theory
- Long-term commitment to quantum computing research
- Program-oriented model while preserving flexibility for individual awards
- Focused on gate-based quantum computing

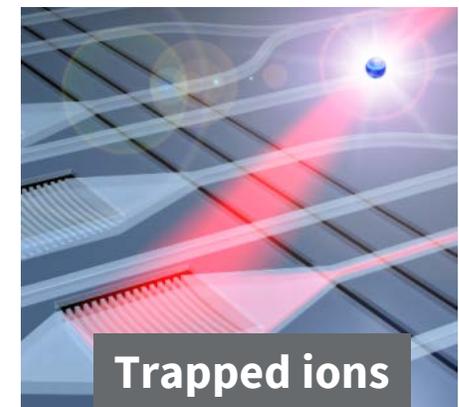
## EARLY ADOPTION and SUSTAINED COMMITMENT in Quantum Information Science



**Superconducting qubits**



**Si quantum Dots**



**Trapped ions**



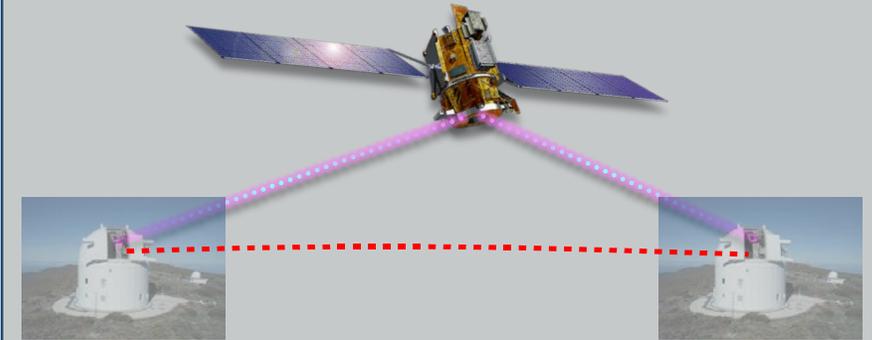
# NASA

***NASA and its partners are responding to the “Strategic Vision for America’s Quantum Networks.” For that vision, NASA and its partners are committed to the development and maturation of all required technologies to enable a space-to-ground quantum link that is able to support the QIS community and advance the US capabilities in quantum communications and networking, for both space and terrestrial applications.***

## ACTIVITIES

- A joint effort to design and build a high-rate and high-fidelity space-to-ground quantum link
- Research in quantum computing and networking
- R&D/T in quantum-based and quantum-enhanced technology development for space- and ground-based applications
- A joint quantum-science experiment on the International Space Station

Design and build of a space-to-ground quantum link



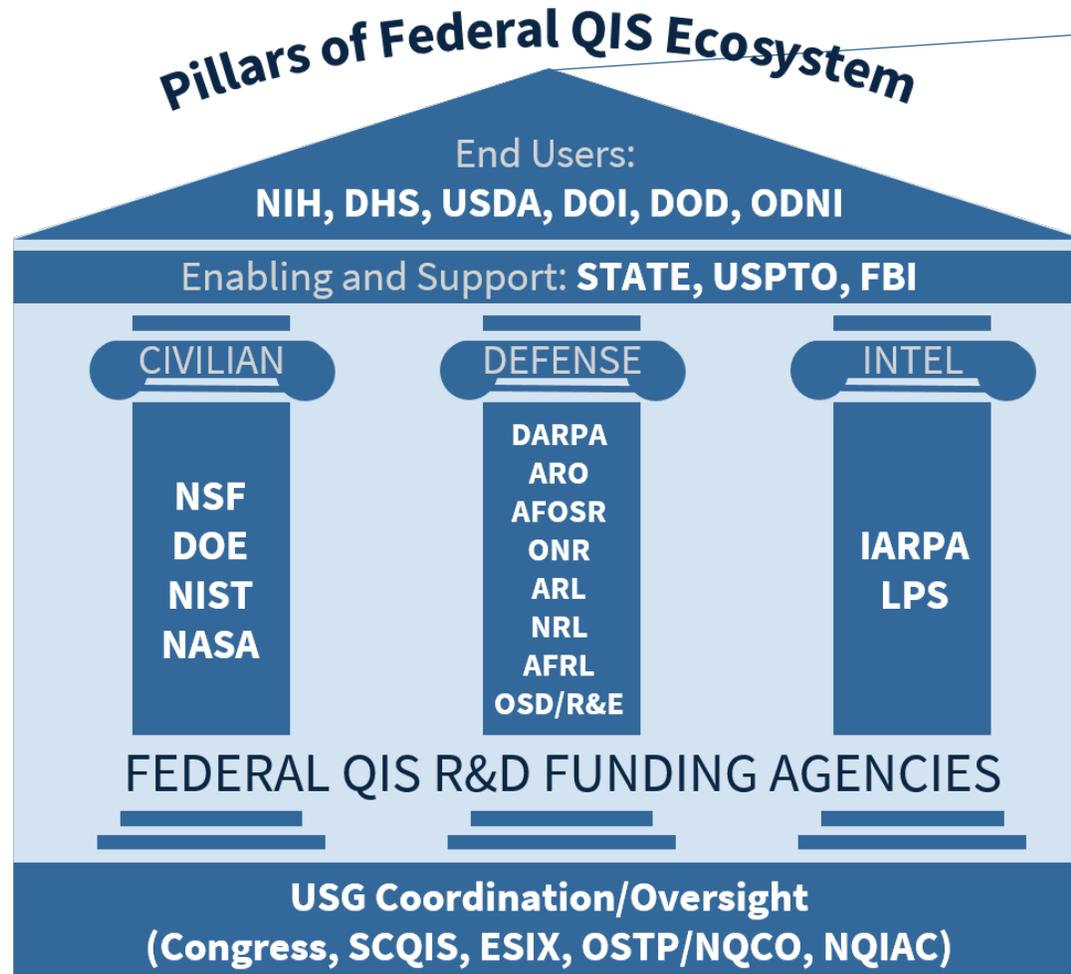
Oct. 23, 2019

Google and NASA Achieve Quantum Supremacy



# And the End-User Agencies

*How can quantum computers, networks, and sensors enhance our ability to...?*



- National Institutes of Health (NIH)
  - Quantum Computing for Biological Sciences
  - Quantum Sensor for enhanced imaging
- Department of Homeland Security (DHS)
  - Data security
  - Gravitational anomalies.
- United States Geological Survey (USGS)
  - Seismic Events



Learn more about all Departments  
and Agencies working in QIS at  
<https://www.quantum.gov>

## Office of Science and Technology Policy

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