

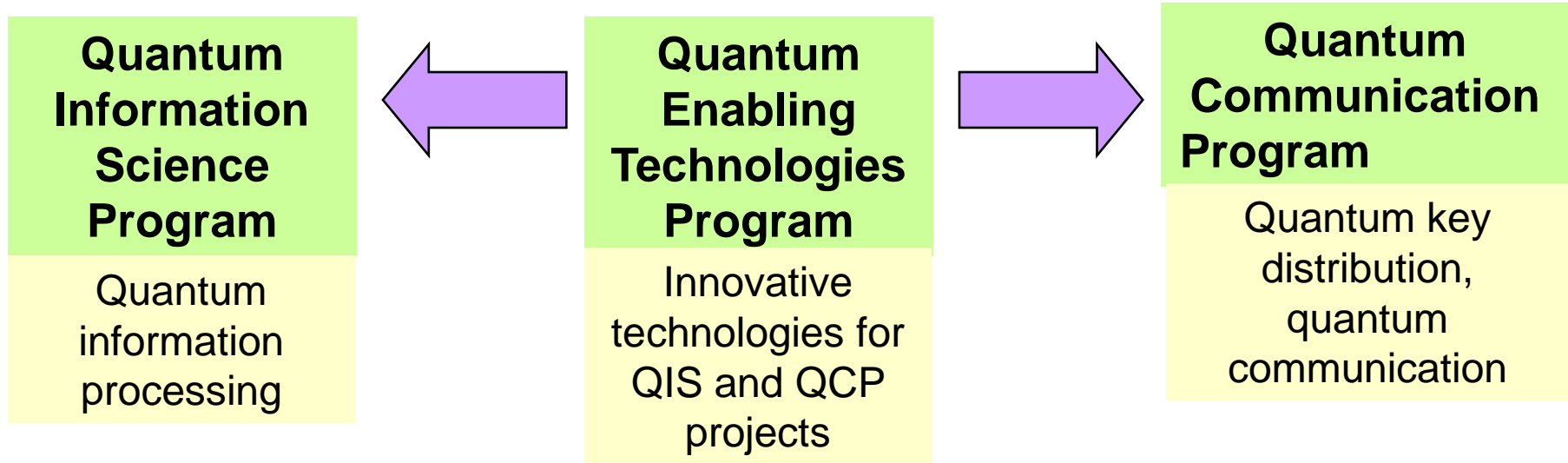
Overview of the IARPA Quantum Information Science Program

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Quantum at IARPA

- IARPA and the communities it serves are interested in quantum information, science and technology for
 - Novel quantum devices
 - Secure communication
 - Efficient solutions to computational problems

Quantum Programs at IARPA



The goal of the **QIS Program** is to build a scientific scale quantum computer and explore its properties.

Major milestones of the **QIS Program** are the demonstration of several interacting logical qubits and an understanding of the best types of error correction codes for different quantum technologies.

The goal of the QComm Program is R&D in quantum communication

The **QET Program** supports the QIS Program by sponsoring the development of technologies that may accelerate progress in QIS and QComm projects.

IARPA QIS Project Categories

- **Quantum Computing Concept Maturation (QCCM)**
 - Remove key obstacles to demonstrating a logical qubit
 - Four year duration (2+2)
 - Multi-investigator efforts
 - Typically funded at the \$500k to \$1M per year level
- **Short-Term, Innovative Concept (STIC)**
 - Explore emerging concepts towards solving looming problems in QIP
 - One to three year duration
 - One to two investigators
 - Typically funded at the \$300k per year level
- **Quantum Computing & Communications Research (QuaCCR) Fellowships**
 - Graduate and postdoc support for US Citizens working in quantum information
 - Three year duration

IARPA QIS Portfolio

- The IARPA QIS Program comprises 13 projects in FY08
- Core technologies are trapped ions, neutral atoms, photons, Josephson junctions and quantum dots, plus theory efforts
- Projects leads are at nine US universities, two USG labs and two EU universities
- Subcontracts are to several US, EU and Australian universities

What QIS Does Not Do

- **PI Startup**
 - Expect PIs to have a viable laboratory for proposed projects
- **Feasibility Studies**
 - Rely on institutional support (e.g. IR&D, start-up packages)
 - Expect evidence of project viability (e.g. initial laboratory tests of key components) before funding a full project
- **Algorithm work**
 - Most quantum algorithm projects formerly supported by DTO/ARDA are now supported by NSA R2-1
- **Theoretical explorations**
 - Theory may support larger experimental projects but are not stand-alone

Other US Quantum Funding Agencies

- NSA
 - Funds quantum algorithm and computer science work
 - Funds QIP work in Kane architecture, NMR, JJs and Q Dots
- ARO
 - Core quantum program funds foundational theory, quantum computing, quantum communications and quantum algorithms
- DARPA
 - Quantum Sensors Program, Optical Lattice Emulator Program, etc.
- AFOSR
 - Quantum Simulation Project
- ONR
 - BAA including quantum entanglement and quantum logic processing; and coherence and control of quantum systems
- NSF
 - Physics at the Information Frontier Program
 - Other programs throughout NSF also fund quantum projects