

Washington Metropolitan Quantum Network Research Consortium

DC-QNet **Overview**

Developing a Quantum Network Infrastructure





AGENDA

I. Description

**II. Organizational
Structure**

III. Key Attributes

**IV. Washington
Metro Dark
Fiber**

V. Activities

**VI. Technical
Objectives**

DC-QNet

A Consortium of six Metropolitan Washington DC USG Research Laboratories

Objective: Create, develop and demonstrate a regional quantum network testbed



DC-QNet:

Attributes:

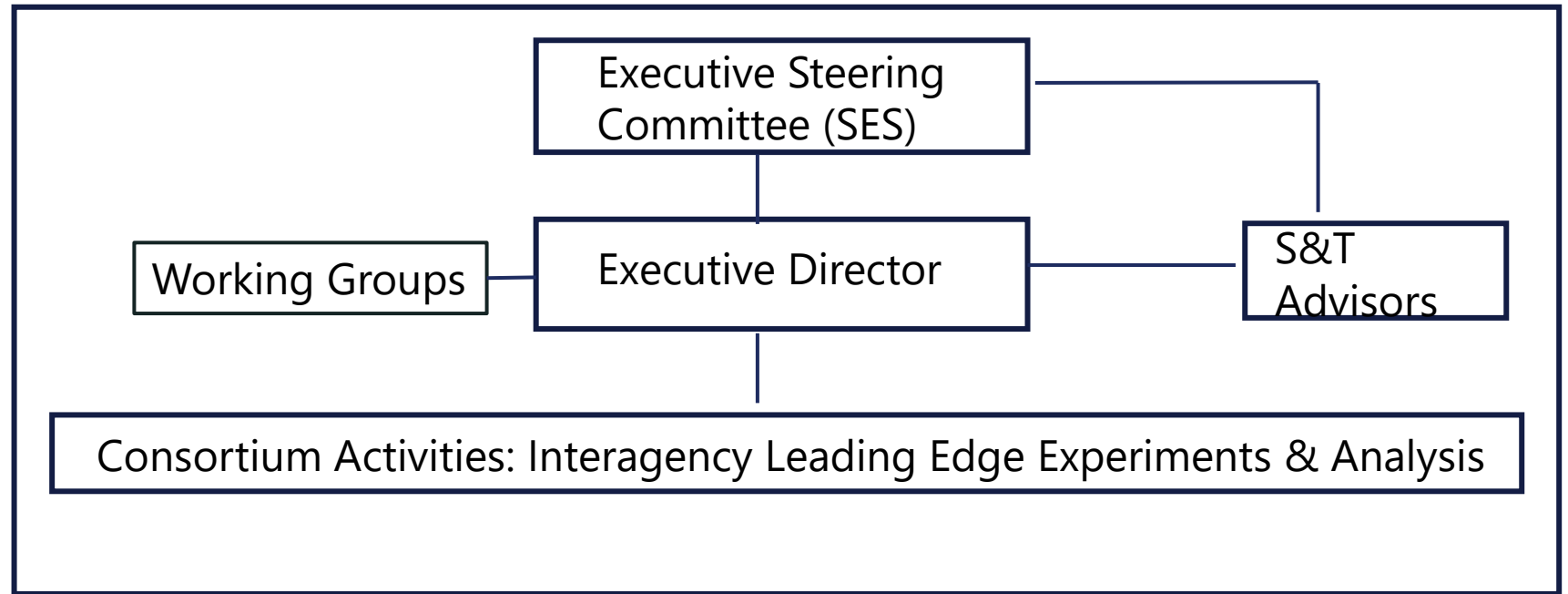
- **An open, non-proprietary, environment for test and evaluation of concepts, components, network protocols, architectures and metrology developed both within and eventually beyond the member agencies.**
- **Enable joint cross-cutting agency synergism in sensor development, secure communications, distributed computing and yet to be discovered use case applications**





DC-QNet:

Organizational Structure

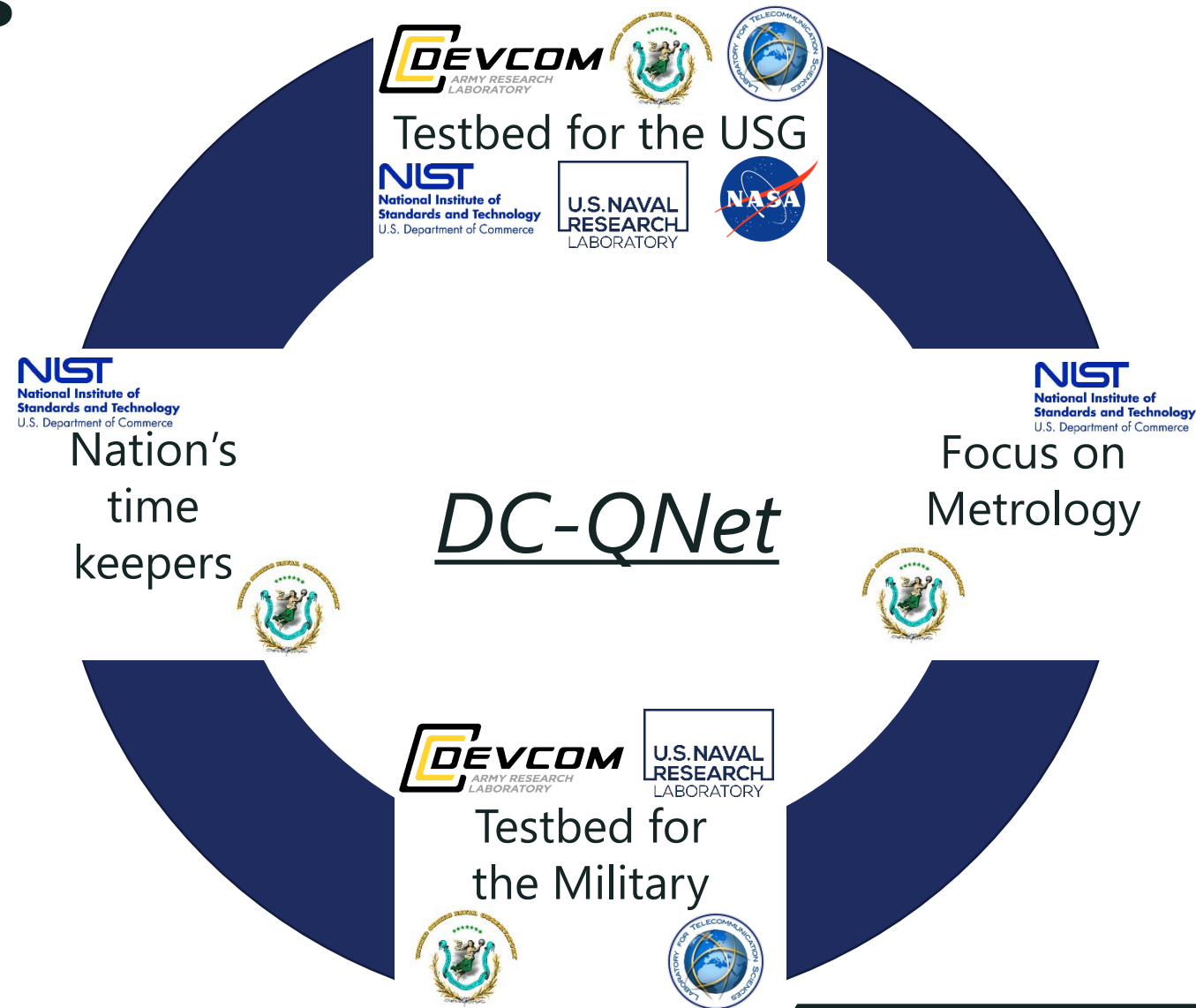


Codified by an Interagency MOU of 18 May 2022



DC-QNet Key Attributes

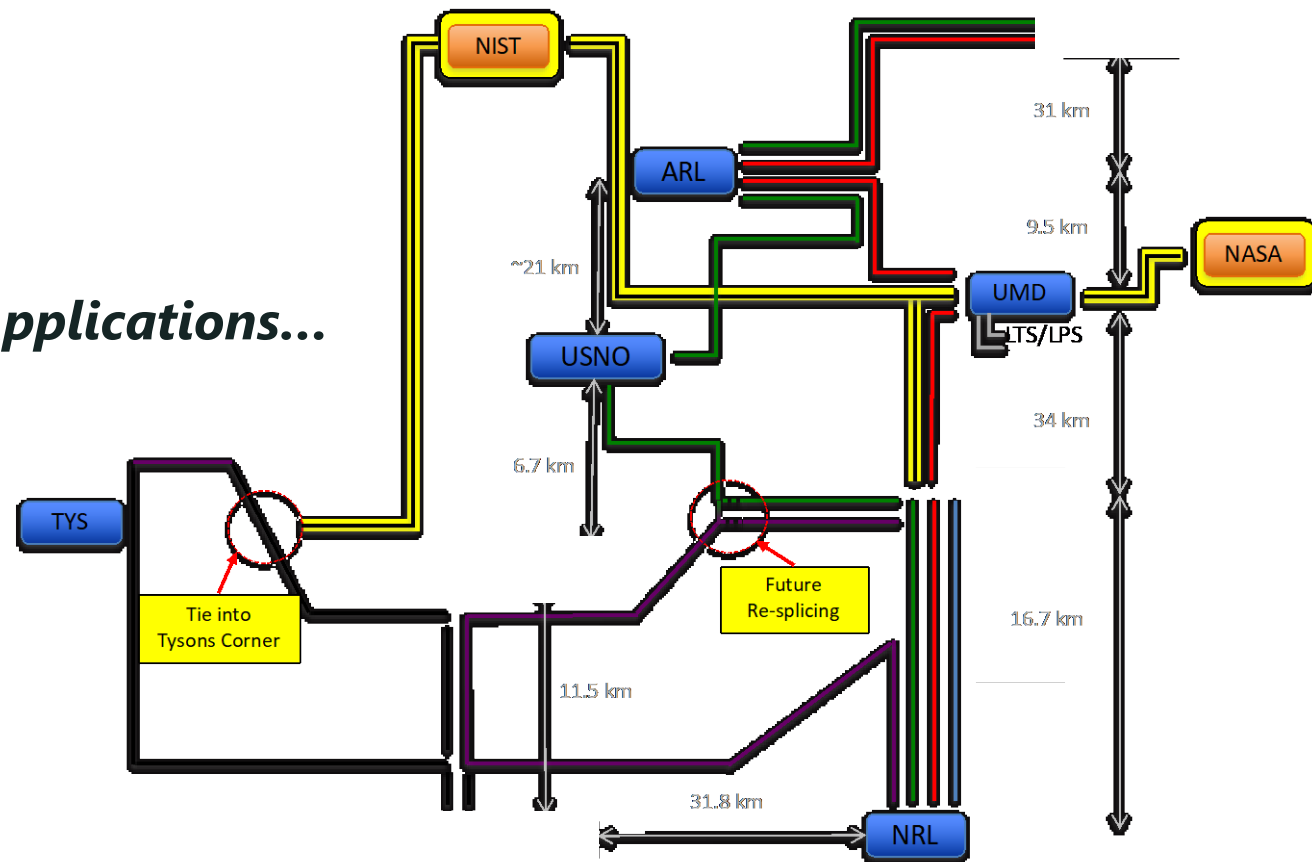
- By having only Federal employees in certain technical areas, we can pursue pre-decisional activities and CUI
- Being in DC makes it easy for policy makers/funding organizations to visit and see the technology as it gets created and use case applications are developed
- Having the best time-keeping expertise may be a prerequisite for quality quantum networking
- Providing a platform for the DoD to test its special quantum network requirements
- A focus on metrology in support of QN will be crucial as precursor to open architectures and standards





From Glass To Applications...

DC-QNet: Washington Metro Dark Fiber Assets



DC-QNet S&T Activities

- **Enabling components for quantum networks**
 - Single Photon Sources and Detectors
 - Quantum memory and repeater components
 - Entanglement generation & storage
 - Quantum frequency conversion
- **Infrastructure for quantum networks**
 - Fiber loss and stability evaluation
 - Fiber stabilization techniques
 - Transduction
 - Synchronization
 - Emulation, M&S
 - Free Space Links
 - Architecture Implementations
- **Early-stage quantum network experimentation**
 - Classical control plane + quantum channel



DC-QNet:

Working Groups

Name	Activities	Status
Experiments	Define experiments for development for the QN	On going
Fiber Network Eval and Stabilization	Existing Fiber and physical infrastructure (Insertion loss and other non-idealities in fiber connections)	On going
Interface Specifications	Ensuring compatible frequencies, time bin ranges, rates, powers, amplitudes, etc.	On going



Overarching Objectives of the DC-QNet

Controlled Entanglement Distribution

Near Term (2-4 years)

- Fiber Characterization and Basic Networking Experiments
- Quantum Interference Demonstration
- Entanglement Demonstration between Nodes

Longer Term (5-10 years)

- Controlled Quantum Network
- Multiple Users with Full Nodes
- DC-QNet regional QN connected to other regional QNs



THANK YOU

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Learn more at:

<https://esc.gsfc.nasa.gov/projects/DC-QNet>

