I.   BACKGROUND

Space R^2 LLC / 081251508 / 84J53 is a woman owned small business (EDWOSB) focusing on the challenges of creating reliable, complex microelectronic systems.

The company was founded by Melanie Berg. She is deemed a FPGA design and verification subject matter expert (SME); and is world-renowned for her contributions to engineering and science.

Ms. Melanie Berg has 30-years of experience as a designer, verification engineer, instructor, and reviewer for a variety of high-speed multi-million gate ASIC and FPGA development teams. Her more visible accomplishments are her contributions to design and V&V in the NASA sponsored New Horizons Pluto and Beyond Mission; and her research/development in the field of FPGA/ASIC mitigation strategies.

For over 14-years, Ms. Berg was a member of the Radiation Effects and Analysis group at NASA Goddard Space Flight Center (GSFC). Her NASA/GSFC responsibilities included: creating radiation test vehicles and associated designs under-test, analyzing and characterizing the effects of ionization to microelectronic systems, defining FPGA radiation test methodologies, designing critical space-flight applications, performing design reviews, researching & developing FPGA/ASIC mitigation strategies, and researching & developing mission system survivability/reliability prediction methodologies.

Regarding cyber-security and Trust, Ms. Berg is a major contributor towards developing a novel assurance framework for the Defense Production Act Title III effort. Additional work include investigating novel design-for-security methodologies and advancing verification strategies for product-reliability enhancement and risk reduction.

Ms. Berg has published and presented several papers concerning such topics as: ionization and microelectronic error-response characterization, reliable synchronous design methodology, robust verification techniques, mitigation strategies for critical circuitry, reliability/survivability prediction calculations, hardness assurance for space flight systems, and ASIC/FPGA Trust/Security schemes.

II. SPACE R^2 LLC CAPABILITIES

Radiation Test and Analysis:

- Test plan development,
- Device Under Test (DUT) hardware and software development,
- Tester hardware and software development (includes complex controls and DUT monitoring),
- Test facility assistance,
- Test data analysis,
- Error rate and reliability prediction,
- Fault injection services

Consultation:

- Design and verification services (ASIC and FPGA),
- Reliability analysis,
- Mitigation strategies (Trust/security and radiation effects),
- Design review implementation, data management, and analysis,
- Advanced assurance techniques,
- Hardware cybersecurity,
- Trusted and assured design practices,
- Seminars and training

FPGA/ASIC Design Services:

- Design for Reliability:
    - Synchronous design,
    - Clock domain management,
    - Signal integrity,
    - System on a chip (SOC) complexity management
- Design for Verification:
    - Insertion of embedded circuits designed to assist in verification
- Design for Testability:
    - Insertion of embedded circuits designed to assist in post-fab testing
- Design for Security:
    - Usage of embedded security features,
    - Insertion of security features,
    - Assertion based secure design,
    - Creation of novel security features focused on device type
- Design for Space:
    - Usage of embedded mitigation,
    - Insertion of mitigation,

o   Creation of novel mitigation strategies focused on device type

FPGA/ASIC Assurance and IV&V: advanced assurance techniques for critical applications:

- Increased reliability,
- Front-end through back-end IV&V,
- IV&V vetting,
- Full product design review and analysis,
- Radiation testing and mitigation evaluation,
- Evaluation of implemented security features,
- Information flow tracking,
- IP core vetting,
- Trojan detection,
- Side channel analysis

Microelectronics Trust and Assurance (Hardware Cybersecurity):

- IP core development,
- IP core vetting/assurance,
- Design for security strategies (can include radiation mitigation strategies),
- Security assurance (through environmental ionization/degradation and adversarial attacks),
- Review services,
- Fault injection activity

Research

- Use of artificial intelligence to evaluate mitigation (cyber and radiation) resilience,
- Development of mitigation assurance electronic design tools