**Department of the Navy SBIR/STTR Transition Program**
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**ONR Approval #43-4388-18**

**WHO**
**SYS.COM: ONR**
**Sponsoring Program:** Office of Naval Research Code 33
**Transition Target:** Future Naval Capability: Quality Metal Additive Manufacturing

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**Other transition opportunities:**
All transition opportunities:

- **Capability:** Quality Metal Additive Manufacturing
- **Transition Target:** Operational Need and Improvement
- **Sponsoring Program:** Office of Naval Research

**WHEN**
**Contract Number:** N68335-17-C-0156 **Ending on:** June 6, 2019

**WHAT**
**Operational Need and Improvement:** Sentient Science’s DigitalClone Optimization module currently under development provides the baseline for a world-class design optimization tool. This will benefit the Navy and AM industry by providing a commercially-viable solution that enables simultaneous design optimization for both inspectability and reliability, a capability that ONR has indicated it finds lacking in the current market. As a result, the Navy will have access to a software solution that can be used by DoD and prime contractors during the design phase – allowing the Navy to implement procurement requirements that not only result in reliable products but also ones that can be more easily inspected by Navy field personnel.

**Specifications Required:** DigitalClone optimization module will redesign the geometry of the part to:
- improve the inspectability of the part as defined by the Probability of Detection (POD)
- keep the mechanical performance the same or improve it

**Technology Developed:** The technology developed will be integrated into Sentient Science’s DigitalClone technology suite, as a new module that will be called DigitalClone Optimization (DCO). The DCO module leverages innovative inspection simulation software and DigitalClone life expectancy technology to provide a capability for users to evaluate design options that enable simultaneous optimization for both reliability and inspectability, an industry first. Although DCO is expected to be primarily used by component designers, it is also highly likely to appeal to advanced operators (like the US Department of Defense) that have a vested interest in evaluating existing designs to determine whether improvements can be made that increase useful life and enhance the ability of inspectors to detect defects in the field.

**Warfighter Value:** In order to ensure the reliability of military weapon systems, especially during high loading environments (such as in the heat of the battle), stringent inspection requirements are occasionally established in critical structural components. Many times this inspections are not a trivial task, due to the complicated geometry or the detailed feature not designed for the proper inspection. Therefore, consideration of inspectability in the design process (before manufacturing the part) will noticeably make the inspection process more effective which ultimately reduces maintenance costs and ensures the reliability of our weapon systems.

**HOW**
**Projected Business Model:** Sentient’s product is a physics-based software platform known as DigitalClone that uses microstructural level analysis of the cumulative impacts of operating loads and conditions to forecast the life expectancy of mechanical components. The DigitalClone platform has a broad array of applications – to include design/process optimization, asset/fleet management, supplier comparisons, and sustainment planning. The set of modules that focus on additive manufacturing design/process optimization and analysis is called DigitalClone Optimization. To host the platform, Sentient has a partnership with Amazon Web Services (AWS) that ensures that the DigitalClone solution’s infrastructure will meet even the most stringent cybersecurity requirements – such as those demanded by the U.S. government for DoD cloud-based solutions. The standard agreement with operators utilizing DigitalClone will be a 5-year (or longer) Long-Term Agreement (LTA) that offers a fixed price and annual subscription for access to DigitalClone.

**Company Objectives:** Sentient is interested in meeting with any Government Program office that is working on or with AM parts. Our initial target list includes both domestic and international existing customers that have ongoing AM initiatives and have already expressed some level of interest in our physics-based solutions:

- **OEM Designers:** Sikorsky, Rolls-Royce, Bell Helicopter, Boeing, Airbus, Advanced Turbine Engine Company (ATEC)
- **Suppliers:** Honeywell, Raytheon, General Electric
- **Operators:** US Army/Navy/Air Force program offices, Defense Logistics Agency

**Potential Commercial Applications:** The five leading industries currently leveraging AM, that can benefit from Sentient’s DigitalClone Optimization include Aerospace, Medical, Transportation, Energy, and Consumer Goods.

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