

Intelligent Engine Technology Study

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Abstract

The goal of the VAATE program is to increase the Capability Cost Index (CCI) of turbine engines by a factor of 10 by year 2017. This goal is translated into tripling the thrust-to-weight ratio, decreasing the specific fuel consumption by 25%, and reducing the development, production, and maintenance cost by 60%. To achieve the CCI improvement goal, the VAATE program is organized into three Focus Areas: Versatile Core, Intelligent Engine (IE), and Durability. A technology roadmap study has been conducted to evaluate the emerging and enabling technologies that will support the IE Focus Area; specifically, the study focused on how active control and engine health management (EHM) technologies can help achieve IE goals through efficient integration.

The study has developed a process for integrating active control technologies with EHM technologies. The study indicates that the integration of active control and EHM can increase engine durability and affordability by improving key metrics in performance, operability, life, and cost.

Three milestones have been identified to facilitate the development of the technology and capability of the IE. Based on these milestones, three most promising integrated control-EHM technologies have been identified, namely, *active tip clearance control*, *active pattern factor control*, and *active combustion stability control*. More detailed analyses and roadmap development for these integrated technologies have been conducted. Some of these results are presented in this paper.

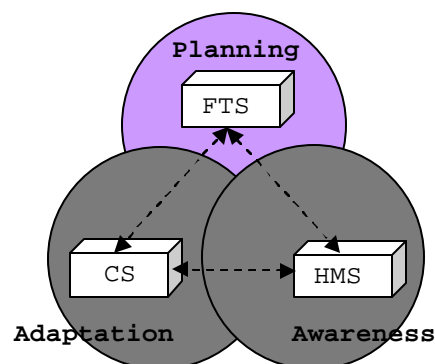


Figure 1: Intelligent system functions and subsystems