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## Functional Safety Management (FSM) for complex engineered systems

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The Functional Safety Management (FSM) discipline ensures that software, hardware and electronic systems tasked with protecting life and property reliably perform their missions. International standards such as ARP4754A, ARP4761, IEC 61508, EN50126/8/9, MoD 00-56, DoD 882D and DO-178B/C, DO-254 and DO-297 provide a set of development lifecycle activities for achieving this by identifying hazardous situations that could occur, evaluating the risk that a hazard could cause an accident and reducing that risk by building high integrity safety functions and operational procedures into safety-related systems. For the past 20 years, I have been teaching a project driven graduate course, Safety By Design (SBD) and Flight Certification (FC) using FSM methods. In the 2018 Georgia Tech Spring Semester SBD and FC Course four complex engineered systems projects were conducted: A stopped rotor Unmanned Aerial System (UAS), a commercial transport aircraft Integrated Modular Avionics (IMA) upgrade, an uber elevate air taxi safety and certification study and a safety assessment for launching the Yellow Jacket Space Program Sounding Rocket, used in this presentation to demonstrate how the FSM discipline can be implemented. The Yellow Jacket Space Program (YJSP) is a student-led organization founded in 2015 and organized as a Georgia Tech club in 2016. The program objectives are to provide students with real-world experience in rockets and rocket propulsion and provide a platform for outreach to students of all academic levels in the State of Georgia. YJSP is achieving these objectives by developing a sounding rocket that will take a scientific payload into space and return it safely to the ground.

### Biography

Daniel P Schrage has been a Professor in the School of AE, Georgia Tech since 1984; Director of the Vertical Lift Research Center of Excellence (VLRCE) since 1986 and Director of the Integrated Product Lifecycle Engineering (IPLE) laboratory since 2007. Prior to Georgia Tech, he was an Engineer, Manager and Senior Executive with the Army Aviation Research, Development and Engineering Command in St Louis, MO from 1974 to 1984. Prior to that, he was an Army Active Duty Nuclear Missile Commander and an Army Aviator with combat experience in South Vietnam and Cambodia. He is recognized worldwide as an airworthiness and aircraft safety expert with over 200 technical papers and book chapters. He has the following degrees: BS Engineering, USMA, 1967; MS-AE, Georgia Tech, 1967; MA Bus Admin, Webster U, 1975; DSc ME, Washington U, 1978.

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