AIAA, your Institute, is moving smartly to stay relevant to you as an aerospace professional and relevant to our industry and our profession. As our industry evolves, we will grow by staying true to our core values, which are built upon technical knowledge and expertise. AIAA has always provided a meeting place where ideas can be freely and openly exchanged in an intellectually challenging, yet collegial, atmosphere. One appealing attribute of AIAA is that it brings together members from industry, government, and academia without a bias or prejudice toward any one of these constituencies. Having existed for over 50 years—over 80 if one includes legacy organizations—we are positioning ourselves to remain relevant for the next half century. Today, like never before, the convergence of technologies from the communications, information, and automation/robotics industries within aerospace systems is changing the way in which we think about designing, building, and operating aircraft and spacecraft, and the systems in which they operate. Advances in legacy engineering disciplines, such as materials sciences and manufacturing are similarly allowing us to reimagine how we do our jobs during any point of the aerospace product life cycle. Many of AIAA’s members are involved in the design, development, and test and evaluation of engineered systems. A large percentage also are involved in research and development, where advances being made today will affect how we take that knowledge and engineer useful and salable products, systems, and services in the future. AIAA’s Institute Development Committee recently has been discussing and deliberating about technologies and adjacent industry sectors that are affecting what we can do as aerospace professionals. By focusing our efforts on industry sectors such as commercial space, cybersecurity, advanced manufacturing, unmanned aerial system operations and rotorcraft/runway independent air vehicle technology, we will provide opportunities to learn, share, and ultimately expand our collective knowledge, uses, and novel applications of these technologies. This is the first of several columns to explore these sectors and AIAA’s role in them.

Within our industry today, systems thinkers and engineers are merging and linking technologies in ways heretofore unimaginable, and in so doing, are revolutionizing our industry. Two striking examples where convergent technologies will revolutionize our industry and profession are the proliferation of unmanned aerial systems operating in the National Air Space and the ever-expanding capabilities and uses in the area of advanced manufacturing.

Small unmanned aerial systems (SUAS) are the current media darling of the aviation industry. Entrepreneurial and corporate communities, as well as government, envision using SUAS for myriad applications, making some form of SUAS traffic management a certainty. A SUAS traffic management system conceived at NASA Ames Research Center and being developed with partners from the aeronautics, communications, and IT industries will realize the vision of ubiquitous SUAS operations for the numerous services and applications that these systems can perform. AIAA is a collaborator in the upcoming UAS Traffic Management Convention 2015 to be held 28–30 July in Mountain View, CA, during which this system will be discussed in an open forum.

Within academia, the FAA has established an FAA National Center of Excellence (CoE) for UAS. Led by Mississippi State University, the Alliance for System Safety of Unmanned Aircraft Systems through Research Excellence (ASSURE) comprises the world’s top UAS universities with 15 core schools and five associate members from three countries and more than 100 government and industry partners. Along with the other member schools and institutions, The Ohio State University was selected as a partner in ASSURE for reasons related to geography, history, and resident expertise. Initial research areas will include detect and avoid technology; low-altitude operations safety; control and communications; spectrum management; human factors; compatibility with air traffic control operations and training and certification of UAS pilots and other crewmembers. Coordination among many partners will be key to the CoE’s success. To that end, Ohio State and the Sinclair National UAS Training and Certification Center will co-host the first Unmanned Systems Academic Summit, focusing on UAS technological advances, research, and education on 24 August in Dayton, OH.

In the area of advanced manufacturing, techniques being used today are revolutionizing designs as we begin to use additive manufacturing techniques to make parts that defied manufacturability by traditional “subtractive” methods. The recent example of the 3D-printed ratchet and socket aboard the ISS from the start-up company Made In Space, located in Mountain View, CA, is paving the way to printing hardware for use in space, in-space recycling, and even possibly manufacturing from in situ materials. Lightweighting is another important trend impacting advanced manufacturing—especially in the aerospace and automotive industries. In 2014, a research consortium led by Columbus, OH-based EWI (the leading engineering and technology organization in North America dedicated to advanced materials joining and allied manufacturing technologies), Ohio State, and the University of Michigan was chosen by the U.S. Department of Defense to operate the Lightweight and Modern Metals Manufacturing Innovation (LM3I) program. Dubbed LIFT (Lightweight Innovations for Tomorrow), the consortium provides the commercial and military sectors with innovative solutions for lightweight subsystem design, component-level manufacturing, joining, and assembly processes and quality control methods, e.g., distortion-control during joining and heat treatment. These lightweighting solutions involve the development of cutting-edge predictive capabilities and standardized certification methods to enable accurate knowledge of microstructure and damage evolution and performance through physics-based models and advanced interrogation tools.

But LIFT won’t focus on technology at the expense of talent. Its vision—to be the world leader in lightweight materials manufacturing—can only be realized if an educated and skilled workforce can use new lightweighting technologies and processes. Its plan to develop and deploy that workforce is comprehensive and spans both the continuum of jobs in manufacturing where the nation is now experiencing a “skills gap,” and the continuum of education and training that must be available in communities and states seeking to sustain, grow, and attract manufacturing jobs.

At colleges of engineering within our research universities, faculty, staff, and students are being challenged to work collaboratively across departmental and even institutional lines, while at the same time doing discipline-specific research that is truly cutting edge. It is an exciting time to be working in the aerospace profession, regardless of your specific role and responsibilities. AIAA intends to progress into these and other areas that represent challenges and opportunities for our profession. With your support and participation, we can perhaps entice those in aerospace and, frankly, those from other discipline areas that are now intersecting with aerospace, to become active in AIAA. In this way, we can all benefit as we conceive, design, build, and operate aerospace systems, taking full advantage of new technologies and technology convergence opportunities.

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