Aerospace in 2016 effectively is a tale of two industries. The commercial sector is brimming with vitality and surging upward. In stark contrast are the businesses who serve government customers; they face a highly uncertain future in the near to mid-term—so much so that the ability of enterprises to manage through extraordinarily difficult conditions during the next few years will be tested to an extent not seen in more than a generation.

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Orders and production of new commercial air transports is at historic highs. While this record-level of activity could slow temporarily mid-decade, stubbornly high fuel prices and healthy traffic growth, especially in Asia/Pacific, will continue to fuel demand for at least the remainder of the decade for the newest airplanes that offer the lowest operating costs.

Market forecasters have long predicted that airlines in Asia/Pacific would outpace the rest of the world in the demand for new aircraft. And it is now becoming increasingly clear just how explosive the growth will be during the next 20 years. The projected numbers are staggering, implying that Airbus and Boeing will have all the production volume they can handle and then some. The numbers also imply the potential for substantial revenue and earnings growth for all suppliers.

But there is a darker side to this halcyon image; the challenges will be every bit as daunting as the production rates that manufacturers will need to sustain—no small feat in itself, given the overall performance of global supply chains on major aircraft development programs in recent years.

To reap the rewards, manufacturers will need to achieve and sustain what may be unprecedented levels of productivity. They also will need to demonstrate a high level of flexibility so they can adjust their production rates, as required. This is especially true for lower-tier suppliers, who historically have proven to be weak links in commercial supply chains. Boeing, pushing for double-digit profitability, will insist on deep supplier concessions in return for access to future aircraft programs. Airbus may follow suit, although there were no firm indications of such action on Airbus’ part as of the end of the first quarter in 2014.

For all its industrial and technological prowess, Japan seems to be content to remain a major supplier to other commercial airframe OEMs. Posing more of a long-term competitive threat are Brazil and Canada, depending on the innovation, manufacturing process improvements and marketing savvy they can bring to future product design and development. Western suppliers will need to figure out how to protect intellectual property and market share in the face of growing pressure to forge more industrial partnerships, especially with China.

Then there is the perennial question surrounding program execution—that is, how skillfully will OEMs be able to produce derivatives and next-generation models that offer improved life-cycle costs, versus finding themselves yet again overpromising and under-delivering to customers who have demonstrated less tolerance for suppliers unable to bring products to market on time and on cost?

Manufacturers who successfully meet these challenges will ride an enormous wave of business, although there will be no letup in the pressure of all players to strive for step changes in efficiency across their operations. Boeing expects the Asia/Pacific fleet to nearly triple in size, to 14,750 aircraft, by 2032. Of this number, nearly 13,000 will be new airplanes. About 75% will be for annual growth in air travel (about 6%) —including the rapid proliferation of low-cost carriers—while 25% will be to replace aging equipment. Altogether, Boeing expects Asia/Pacific airlines to account for 36% of the world’s new aircraft deliveries by 2032, with China taking nearly half. Total value: nearly $2 trillion. Airbus forecasts for new aircraft demand are comparable.

On a more somber note is the near- to mid-term outlook for defense contractors, although there is this encouraging note: The value that the Department of Defense is placing on government-funded R&D for technologies critical to national security—and DoD’s expectations for industry to maintain healthy levels of company-funded R&D in select technologies—suggests that there will be substantial business opportunities up for grabs in certain markets when weapons modernization resumes in earnest.

Until then, suppliers will face an extremely challenging future as they attempt to adjust to three business/political realities: 1) sequester-driven cuts in programs, particularly during the next two years 2) uncertainty in program funding, with Congress being the biggest wildcard, and 3) the next phase of the Pentagon’s affordability, or “Better Buying Power,” initiative.

While some of the biggest challenges that defense contractors face is beyond their control, there is much that companies can do to improve their business prospects.

OEMs also will face agonizingly difficult choices over whether to re-engine certain older models, as in the case of the A380, or invest huge amounts of money in new designs. Errors in judgment could cost both builders sizeable market share and put them at a financial disadvantage for years, constraining their ability to invest in new product development.

In addition, all Western suppliers must anticipate serious competition from China and possibly Russia, although they too will experience their own challenges developing new aircraft and winning certification. Chinese and Russian forecasts of first flights and initial deliveries should be considered unreliable guesstimates, at best. All the same, the two countries, working both solo and in partnership, are apt to introduce clean-sheet models, with technology newer than what was available when Boeing launched the 787.
From the perspective Frank Kendall, Under Secretary of Defense for Acquisition, Technology and Logistics, the current [business] planning environment for defense contractors is as difficult as he has ever seen. He expects 2015-2016 to be especially challenging for the defense community. Senior DoD leadership advises suppliers to be prepared for potential worst-case cuts to modernization accounts of about 20% between 2015 and 2019. 

Over the longer term, the ability of the U.S. to sustain technological superiority in all areas critical to national security will be at risk. Of greatest concern to Pentagon officials are control of the high ground (space), precision missiles targeting naval assets and logistics nodes, EW in air operations, air-to-air missiles and missile defense. 

The two areas where the U.S. continues to have a clear lead technologically are stealth and high-performance turbine engines. DoD will continue to invest in advancing both technologies. 

The outlook for the F-35 Joint Strike Fighter, DoD’s highest priority, is much improved from a year ago. The program is on a realistic baseline, and slow but steady progress is being made on all fronts. While the cost per airplane is coming down, affordability remains the No. 1 priority. The Air Force has set July 2015 for initial operational capability. Multiyear procurement of E-2D aircraft, the “eyes” of the fleet,” is the U.S. Navy’s most important program, according to Chief of Naval Operations Adm. Jonathan W. Greenert. 

Since Deputy Defense Secretary Ash Carter introduced DoD’s “Better Buying Power” initiative in September 2010, industry has made good progress in improving the affordability of weapons systems. DoD also has seen notable progress in companies’ should-cost analyses. Under the more recent Better Buying Power 2.0, DoD expects contractors to continue to lower the cost of weapons systems, even if it is only incremental reductions.

Preservation of research and development efforts aimed at advancing the most critical technologies will trump procurement as long as the current fiscally constrained environment lasts. Large new programs will be very limited. When faced with a strategic choice, the Air Force will recapitalize rather than modernize and divest capabilities and capacity intended for lower-priority missions.
DoD is urging industry to treat independent R&D spending as a non-variable expense and maintain healthy levels of investment, including early prototyping (versus full-scale development). Early prototyping also shortens lead times for transitioning new weapons systems into the hands of war fighters. DoD will be selective in choosing the weapons systems it wants, based on how fast a given technology can be fielded. Shortening this cycle time is extremely important to DoD. Companies who fail to heed DoD’s advice on maintaining healthy levels of R&D investment will risk putting themselves at a competitive disadvantage in the future.

For their part, U.S. aerospace/defense prime and second-tier contractors are operating their businesses under the assumption that full sequester will remain in place for the foreseeable future. These companies will spare virtually no effort—including making further staff reductions, consolidating more facilities and putting greater pressure on suppliers—to protect profit margins.

Recognizing that advanced technology will be the competitive differentiator in the future, many contractors appear committed to holding the line on IR&D spending. This is in sharp contrast to previous industry downturns in the post-Cold War era. Some companies—such as Boeing Defense Systems and Northrop Grumman—plan slight increases:

- Intelligence, surveillance and reconnaissance (ISR) systems.
- Electronic attack.
- Unmanned systems.
- The electromagnetic spectrum.
- Military space.
- Sensors.
- Missile defense.

For lower-tier suppliers, sequester-driven program funding means that smaller companies will need to re-examine their own cost structures and operate leaner if they expect to remain competitive. At the same time, OEMs will expect suppliers to assume greater responsibility for innovation and lowering the cost of technological improvements—or risk being dropped.

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**Operating Profits**

![Operating Profits Chart](image_url)

SUS billions, includes companies with annual FY2013 revenues exceeding US$5 billion. Computation: Sum of revenues remaining after production and marketing costs to total revenues

* Source: Aviation Week & Space Technology
While some of the biggest challenges defense contractors face is beyond their control, there is much that companies can do to improve their business prospects. For example, they could shorten the time it takes to develop contract proposals. Excessive timelines put execution-year and follow-on dollars at risk. OEMs also could encourage their suppliers to do a better job of preparing contract proposals, with an emphasis on reducing costs that otherwise would be reflected in those proposals. All contractors in general would do well to consider this assessment by Lt. Gen. Charles P. Davis, Military Deputy in the Office of the Assistant Secretary of the Air Force (Acquisition): “All programs that struggle are doomed to do so before the contract is signed.” Expendable overhead can range from 30-60% of contractor costs.

In addition, companies could focus more on mature technologies to help contain costs. There are three areas where contractors should be concentrating on innovative technology and processes.

- Mitigate current threats or emerging ones, such as countering weapons of mass destruction.
- Exploiting commercially available technologies.
- Building modularity into weapons systems to improve their affordability.
- Developing technological surprises for existing or potential adversaries.

Finally, expect DoD to differentiate between companies who are trying to reduce costs and those who are not. The two groups will not be treated equally. From DoD’s perspective, the biggest opportunity for cost savings is in sustainment.

A 24-year veteran of Aviation Week, Tony Velocci is former editor-in-chief of Aviation Week & Space Technology magazine as well as editorial director of Aviation Week Group.