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## COMMENTARY

# Innovation's Understanding Gap

## Technical setbacks are hallmarks of progress

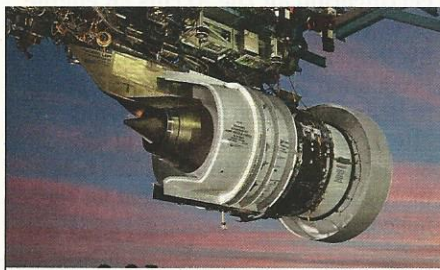
**T**homas Edison didn't invent electric lights, but he did create the first commercially successful lightbulb—after repeated setbacks in finding the right filament material. His invention was a game changer that speeded the process of electrification and changed forever how we live after the Sun goes down. Pratt & Whitney didn't invent the jet engine, but it bet the proverbial farm that it could perfect the geared turbofan (GTF), a decades-old idea.

The painstaking effort was not without challenges, such as a widely publicized failure of a PW1500G on the first C Series test aircraft. Now that the engine is entering into commercial service, GTF-powered aircraft will be quieter, burn less fuel and produce fewer emissions—and the engine is proving to be a market disruptor.

By the time Larry Page and Sergey Brin developed Google, people were accustomed to web-surfing with search engines. With a clever algorithm that consistently delivered relevant search results, Google quickly established its leadership—although not before resolving complex issues connecting the hundreds of thousands of machines that make up a Google data center. The Boeing 707 wasn't the first jet airliner, but it was much faster and could accommodate more passengers than aircraft that came before. It also flew at higher, safer altitudes, opening air travel to more people and sealing the fate of ocean liners.

Countless people around the world benefit immeasurably or will benefit from such transformative innovations. Chances are, however, they give little thought to what it took to bring them to fruition. In addition to money and persistence, it required technical and scientific setbacks—failures, in today's parlance, on the road to success.

Innovation, of course, is critical to raising standards of living around the world. The question is: Have business,



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government and society in general become so intolerant of risk that they have lost any sense of perspective of what the innovation process involves?

Relatively little is known outside engineering and scientific circles about what drives innovation. Nowhere is this knowledge gap more evident than in the aerospace industry, where the need to innovate is as important as ever in a rapidly evolving market environment faced with growing competition from commercial companies.

The history of the aerospace industry is replete with dazzling technical achievements—unmanned air systems, radar, digital computers, composites, directed-energy weapons, satellites, GPS navigation and stealth, to name a few. The scientific teams responsible for these accomplishments experienced failures on the path to perfecting most, if not all, of these highly engineered technologies—failures that were the target of widespread criticism, as though setbacks were anomalous to sound research, development, test and engineering

activities. Trial and error, basically.

The reality is that none of these technological marvels would exist today if all of the engineering problems had not been solved by learning from technical setbacks and pushing the state of the art, sometimes creating new products and markets in the process.

Failures hold the key to solving engineering problems. What should concern all stakeholders is that the trend toward diminished tolerance for such setbacks and risk-taking is influencing the behaviors of many aerospace companies; they have started favoring short-term value creation over longer-term value creation through basic and applied research and development.

Indeed, investors are more likely to penalize companies that choose to increase R&D investment, especially if it involves pushing technology boundaries. Inevitably, such initiatives sometimes cause technology-development programs to exceed cost and schedule projections, exposing companies to risks at the hands of customers, investors, lawmakers and policymakers, and undermining their reputations as otherwise well-run businesses.

What is required is an industry-led sustained and vigorous educational campaign to raise awareness of what the innovation process involves, with “sustained” being the operative word. The public at large—and investors and policy makers in particular—need to understand that setbacks in developing and testing advanced technologies are actually learning experiences that should be interpreted as the hallmarks of progress, not of failure.

Leadership in aerospace—and every other manufacturing sector, for that matter—is not a birthright. Talent and technology innovation have shaped society's past, and they will surely shape its future. But all stakeholders must understand what spawns innovation and how new products are brought to market. With industry's help, in time they could be educated on how to put technical setbacks in proper perspective so that the drive to innovate in all fields remains healthy and fruitful, promoting a better balance between short-term and longer-term strategic goals and ensuring a better quality of life for societies the world over. ☺