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HOW TO BUILD A

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Inside OneWeb's Florida factory, where the mission is to beat SpaceX to satellite internet **PG 16**



How movies inspire innovation



▲ Astronaut Samantha Cristoforetti of the European Space Agency tweeted this photo as a final salute to Star Treks' Leonard Nimoy when he died while she was serving as a flight engineer on the International Space Station in 2015. She wrote: "Of all the souls I have encountered, his was the most human. Thx @TheRealNimoy for bringing Spock to life for us." NASA

A good movie or TV show can do more than transport us to another world for two hours. It can stimulate engineers and scientists to take on thorny questions that will propel their careers. A movie may even have encouraged one billionaire to launch a rocket company. **Amir S. Gohardani** takes a look at the symbiosis between fiction and facts.

BY AMIR S. GOHARDANI

The house lights dim. The silver screen lights up to the roaring sound of a piston engine sweeping away from us. At 9 o'clock, a Zeppelin is engaged in aerial bombardment as the Red Baron's Triplane suddenly appears out of nowhere with a climbing spin. Shock and awe, and within seconds we are catapulted into an aerial battle that unfolds at a pace matching our popcorn consumption. Then, in the turmoil between war and peace, it arrives: that one scene that the aeronautical engineers in the audience will deem as totally implausible. They will quietly roll their eyes and after the closing credits engage in an endless critique.

Welcome to the magic of the movies or, for that matter, TV and literature. The power of the story draws us in more than the validity of the depicted aerospace engineering concepts. Even if the technology doesn't exist or defies the laws of physics, it inspires new trains of thought aimed at bringing the impractical into the realm of the practical.

In an exemplary case, versions of "Scotty, beam me up," from the original "Star Trek" series have inspired millions, if not billions, to think about time and space travel. This is despite the implausibility, I presume, of ever beaming a person from one location to another — although human holograms come close.

Marrying imagination with unprecedented technical achievements is not new. In literature, Jules Verne, the French novelist whose many works have been dramatized, envisioned space travel in his novel "From the Earth to the Moon" published in 1865. Verne's literary work inspired me as a youngster growing up in Iran and, I would later learn, many before me, including pioneering American aviator Rear Adm. Richard Evelyn Byrd Jr.; Yuri Gagarin, the first human to journey into outer space; Konstantin Tsiolkovsky, the Russian and Soviet rocket scientist; Wernher von Braun, the German and later American aerospace engineer and space architect; and Jack

Parsons, the American rocket engineer and rocket propulsion researcher.

Words and images serve a larger purpose: They encourage out-of-the-box thinking.

Yet, there is much more at play. If one considers books and movies as tools for learning, then these mediums encourage out-of-the-box thinking, like the wake effects in a world unbounded by conventional reality. Technically minded readers or viewers are free to question the status quo. A holistic approach unfolds, meaning one in which the innovator honors none of the traditional boundaries among physics, chemistry, materials science, aerodynamics and other disciplines. The result is a new norm for how one should go about defining solutions to technical problems.

Of course, it's worth noting that efficient learning engages different senses, and in this regard, everybody does not learn in the same way. Examples are auditory learners (learning by listening), kinesthetic learners (learning by doing or through physical activities) and visual learners (learning by viewing graphs, charts, maps and diagrams). The breakdown of learning methods is complex and often includes mixed modalities and a variety of other unexplored factors.

When films were born in the 20th century, they strongly engaged the visual and auditory modes of learning, and so this new type of entertainment engaged a larger portion of the population than books alone. I acknowledge that books have always fueled readers' imaginations. Movies, however, add a touch of realism to that imagination and depict an animated example of an envisioned concept. Naturally, the secondary wave of imagination is then an alternative version of the envisioned concept. There are countless examples of the concept of time travel in literature. Samuel Madden's "Memoirs of the Twentieth Century" from 1733 dealt with a guardian angel traveling back in time. Later, countless authors, including Charles Dickens, Mark Twain and Isaac

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Asimov, explored the concept. But the depiction of time travel in the Stargate sequence of “2001: A Space Odyssey” was an entirely new experience. This movie earned Stanley Kubrick 13 Academy Award nominations and one Oscar for special effects. Douglas Trumbull, the movie’s special photographic effects supervisor, ingeniously depicted time and space travel with a mixture of colors and light. Among the viewers impacted by this sequence was filmmaker Steven Spielberg, who repeatedly watched the movie for its creative use of the visual medium.

There is little doubt that films and visual medium elements have societal impact. That said, the size of this impact, as for instance measured by an influencing indicator on a population in society, is debatable and this alone is the power of movies. The discussions about that depicted impossible scene or the series of events that unfolded contrary to what would happen on an aircraft or onboard a space station, in air or space, all lead us to further analysis of what we have witnessed. In this process, we make inquiries and even learn to find out what really is possible and how far a specific technology has been developed. We record, process, analyze and draw conclusions, constantly examining the technical areas before us.

I vividly remember reading Jules Verne’s book series when I was 7 years old. Elements of these books and others were brought imaginatively to life through animated TV series and movies. One of the movies that I found especially appealing was 1951’s “No Highway in the Sky,” which is based on Nevil Shute’s 1948 novel. In the movie, an aeronautical engineer predicts that a new model of the airplane would fail catastrophically and in a novel manner. The movie touched on the outer bounds of aircraft design, a topic that proved interesting

to me as a child and still does today. Nevil Shute was, of course, an English novelist and aeronautical engineer, so his insightful perspectives assisted with painting a plausible storyline. A leap down memory lane brings me back to my room decorated with cards featuring aircraft and their technical performance data. Posters and television shows featuring various elements of aerospace technology were part of my world until the aircraft design process began in my mind. Ultimately, these series of steps were continuously improved by my father, an aeronautical professional. Looking back, I cannot have asked for a more glorious period in my life and a better source of inspiration than to emerge in an environment where imagination constantly squared off against the laws of physics and the realms of possibility.

Interestingly, many of those who currently spearhead efforts in the aerospace sector also have had their shares of inspiration. Jeff Bezos is a “Star Trek” fan, according to Christian Davenport’s book “The Space Barons.” And Bezos reportedly watched the movie “October Sky,” about the amateur rocket exploits of Homer Hickham, in 1999 with science fiction author Neal Stephenson, who encouraged Bezos to follow his interest in starting a rocket company. One year later, Bezos founded Blue Origin.

As humans, our paths to our desires and dreams are shaped by our imaginations, perceptions and impressions. The influence of movies on society and the aerospace industry and workforce is notable. Next time that one impossible technical scene plays before your eyes, it is worthwhile to embrace those moments as a vehicle that adds momentum to the discussions for alternative technologies or encourages our minds to identify a myriad of pathways to making the impossible possible. ★



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