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Explaining SpaceX's Success

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A new book details the ins and outs of the relationship between Elon Musk's SpaceX and NASA.

by Rainer Zitelmann

Yesterday marked the sixth test launch of SpaceX's "Starship" shuttle, following a fifth successful test in October. If you want to know how this was possible, you should read this book. There are plenty of books about the aerospace company SpaceX, and I have read most of them. However, the recent book by astronomer and space expert Eric Berger, *Reentry: SpaceX, Elon Musk and the Reusable Rockets that Launched a*

Second Space Age, stands out as the best. In particular, it portrays the checkered relationship between NASA and SpaceX.

Initially, the CEO, Elon Musk, faced significant opposition from both political figures and NASA officials. Charles Bolden, who would serve as NASA administrator during President Obama's tenure in the White House, was a skeptic of Musk and SpaceX. The powerful U.S. senator who held NASA's purse strings, Richard Shelby (R-AL), declared that efforts to rely on private companies like SpaceX represented a "death march" for NASA.

These were strong words, especially after NASA's shuttle program had fallen far short of every one of its stated objectives, with each shuttle launch costing approximately $1.5 billion including "development costs, maintenance, renewal, and other expenses."

They were also strong words when you consider that launch costs more or less stagnated between 1970 and 2010 and that several attempts by NASA to develop reusable rockets (the X-33 and X-34) were abandoned.

After the shuttle program was terminated in 2011, the United States had to rely on old Russian rockets to reach the International Space Station. Thanks to SpaceX, launch costs have decreased by a factor of eleven. SpaceX currently launches a hundred rockets a year and has completed forty-three flights to the International Space Station (ISS).

NASA's decision to procure services from private companies such as SpaceX was initially born out of necessity. According to Berger, a small number of individuals at NASA, including Kathy Lueders, played a crucial role in fostering a partnership with SpaceX. Lueders, who headed a small team and was responsible for liaising with SpaceX, actively supported Elon Musk's vision for success. Inside NASA, Lueders fought against the excessive bureaucracy and pushed back on mid-level managers at the space agency seeking to levy additional rules and requirements on private companies. Mostly, she succeeded. Whereas the space shuttle had more than 10,000 requirements, Dragon from SpaceX ended up with about 400.

Three or four times a week, someone at NASA would come to Lueders and tell her, “I’d hate to have your job.” Hardly anyone believed that SpaceX would succeed. “But Lueders,” Berger writes, “understood that NASA had no choice.” Ultimately, a productive partnership blossomed between NASA and SpaceX, largely due to the efforts of Gwynne Shotwell, the president and chief operating officer of SpaceX. Musk has many strengths, but patiently negotiating with government and NASA officials is not one of them; Shotwell was clearly better at this.

Collaboration between SpaceX and NASA created a paradigm shift. Previously, NASA provided private companies with specific instructions on constructing a rocket, leading to high costs as the companies followed their instructions meticulously. Through cost-plus programs, there was not the slightest incentive to reduce costs; instead, they were incentivized to increase costs. Musk insisted on fixed prices. Instead of telling SpaceX what to build, NASA specified what services it wanted to buy. “Musk did not want to build a spacecraft and sell it outright to NASA. Rather, he wanted to build the spacecraft and charge NASA a fee to fly its cargo.” As one employee put it: “It’s like FedEx. You provide us a package, and we’ll deliver it to space for you.” Adding: “This seems obvious today, but the look of horror on their faces was very, very real.”

This new approach was the foundation for NASA and SpaceX’s mutual success. Nevertheless, tensions arose because Musk made his goal of one day flying to Mars the basis for all his decisions. This aspiration sometimes conflicted with NASA’s objectives. Berger shows that many of Musk’s technical decisions are based on his unwavering commitment to the dream of establishing a human presence on Mars.

A recurring theme throughout Berger’s book is the bureaucratic rules and regulations that drove Musk to despair because they consume time and energy that could have been invested in more important things. Hans Königsmann, one of Space X’s top engineers, lamented: “They were really extreme with their environmental tests, which had nothing to do with the real environment.”

Traditional space companies, often resembling cumbersome government agencies, had no issue navigating the countless bureaucratic requirements, but they drove an innovative and impatient entrepreneur like Elon Musk to despair. The book provides

many examples of Musk's frustrations, but I would like to mention one that Musk recently highlighted in a speech after the successful fifth test flight of the Starship:

SpaceX had to do this study to see if Starship would hit a shark. I'm like, 'It's a big ocean, there's a lot of sharks. It's not impossible, but it's very unlikely.' … OK fine, we'll do the analysis. Well, can you give us the shark data? They're like, 'No, we can't give you the shark data.' We're like, 'OK, well then, we're in a bit of a quandary. How do we solve this shark probability issue?' And they said, 'Well, we could give it to our western division, but we don't trust them.' And I'm like, 'Am I in a comedy sketch here?' … Eventually, we got the data, and we run the analysis to say, 'Yeah, the sharks are going to be fine.' But they wouldn't let us proceed with the launch until we did this crazy shark data. Now we're done. But then they said, 'But what about whales?' When you look at a picture of the Pacific, what percentage of the surface area of the Pacific is whale?… It's just one crazy thing after another. So yes, I'm really feeling the pain of government overregulation.

The United States should not make the same mistake the Europeans are making in the realm of space exploration. Instead of being world champions in innovation, Europeans are world champions in regulation. This year, there have only been nine successful rocket launches in Europe, while SpaceX alone has carried out more than a hundred.

Rainer Zitelmann is the author of the books The Power of Capitalism *and* In Defense of Capitalism.

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