

**Tech-Clarity**

# Operationalizing Collaboration to Launch **Space Startups**



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# Winning the New Space Race

## The Business of Space is Hard

Winning the new space race to create a successful space industry startup is an extremely challenging yet rewarding endeavor. Getting equipment to space is a complex technical challenge. But launching a startup in the new space industry faces its own unique challenges.

Launching a successful space startup requires substantial investment in the face of extreme competition. It demands top talent and significant innovation to define, develop, and create a unique offering that fills a niche opportunity in a crowded market. However, it can also be very lucrative for those who effectively develop and launch the right kit and capabilities.

## The Product Development Status Quo is Not Enough

Launching a space startup requires world-class product development and planning. To succeed, engineering teams must be innovative and agile internally and within their supply chains. That's no easy task. Today, over one-half of manufacturers miss project due dates on an average project. About one-half also miss product development budgets.<sup>1</sup> This performance is not competitive in the new space race.

## It's Time to Operationalize Collaboration

How can space startups improve innovation and product development processes to beat the odds and secure funding, gain confidence from their stakeholders, deploy their technology, and drive profitable growth? One of the proven keys to drive innovation and product development success is to raise collaboration to the next level by maturing from ad hoc processes to an operationalized, digital approach. Effective and efficient collaboration is crucial in the space industry because getting to space requires multiple disciplines and companies across the value chain to work closely together.

How can new space startups improve collaboration to drive innovation and meet time, cost, quality, performance, and reliability targets? It's time to learn from best practices and operationalize collaboration.



# Defining Success for a Space Startup

## Setting the Stage

Countless companies are trying to develop satellites, launchers, and other space-related technology. The shift from government-led satellite development to more commercial programs has created a dynamic, competitive market. Private industry has entered the race and raised the bar on success.

## Innovation is Mandatory

Winning in space demands significant innovation. There are more satellites and satellite development initiatives than ever before. These ambitious programs focus on more sophisticated payloads, nanosatellites, constellations, and robotics. Yesterday's approaches aren't sufficient as innovators explore service, refueling, and upgradability in space to increase ROI and sustainability.

## Speed is Critical

Space startups in this environment must innovate rapidly to bring new capabilities to the field in time to be relevant. Today's competition moves fast, and market needs change rapidly. In the new space race, time to market is rewarded and late entries may lose relevance, even if they develop something compelling and unique.



Less than one-half of the companies surveyed in our research, only 42%, meet product development dates within 5%, on average. Only 44% are this good at hitting their product development budgets.<sup>1</sup> Winning the new space race demands more.

# Winning the New Space Race Demands More

## Managing Cost Matters

Despite significant investments, space startups must be efficient to control costs and get the most out of precious funding and limited engineering resources. At the same time, they must be agile and flexible to meet changing demands and incorporate rapidly evolving technologies.

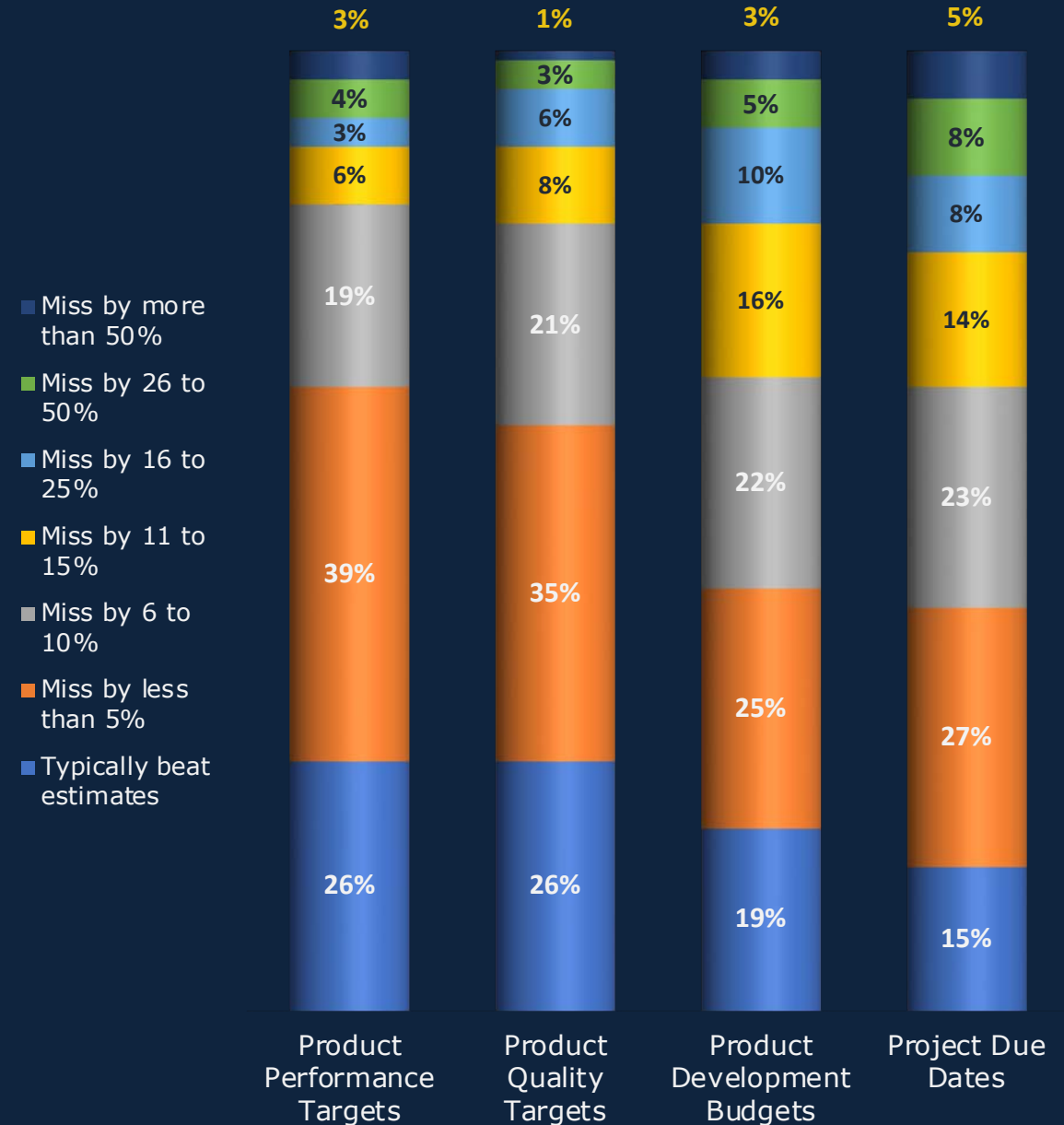
## Get it Right the First Time

Space is unforgiving, as is the new space industry. Startups need their product to be right the first time. They must harness complexity, not just manage it, to innovate and differentiate. But they have to do it with quality and reliability. To succeed, they must be fast and efficient but can't afford to sacrifice quality and performance to meet due dates and budgets.

## Collaboration is Essential

Driving innovation, speed, efficiency, and precision to get into space requires teams of experts and a collection of world-class technologies. To incorporate the right capabilities, space startups must be able to work fluidly with their supply chain partners that design and develop specialized components such as batteries, antennas, and thrusters. Startups have to seamlessly share designs and knowledge with their co-development partners across the supply chain that can bring optimized technology to support a highly specialized scenario.

## ABILITY TO MEET PRODUCT DEVELOPMENT TARGETS<sup>1</sup>





# Make Collaboration a Core Discipline

## Collaborate like a Leader

It's time for space startups to operationalize collaboration to take product development to the next level. The potential is there. Our research shows that Top Performers, manufacturers that are better at hitting their product development targets, have better design collaboration.<sup>1</sup> Effective collaboration requires getting the right people involved, with the right data, at the right time. Collaboration has to be fast, natural, and fluid to support engineers spread across design disciplines, departments, and the supply chain. Effective collaboration supports processes aimed at getting designs right the first time by proactively managing conflicts and tradeoffs to prevent integration issues.

## Collaborate in Context

Engineering collaboration is a specialized activity and requires more than standard tools like Slack or Microsoft Teams. It requires a data-centric approach that creates a holistic view by interpreting and integrating design files of all kinds in addition to supplier and component data. It should also be able to share and visualize simulation results. All of this information must be kept in context with managed

relationships between data elements. Engineering-aware collaboration allows startups to make changes accurately, allowing them to confidently assess and manage the impact of incorporating new capabilities or technology between companies and across mechanical, electrical, and software domains.

## Collaborate Across the Project and the Product Lifecycles

Collaboration should also extend to the project, issue tracking, task management, and approvals. Further, startups must be able to collaborate visually, especially with non-engineers including business leaders and investors, by creating realistic renderings to give everyone a clear picture and get everyone on the same page.

For space startups, it's essential to consider that effective collaboration must respect design configurations throughout the product lifecycle. Startup teams and their supply chains must be able to collaborate from requirements through design to production to testing and operations, focusing on the right revision and configuration.

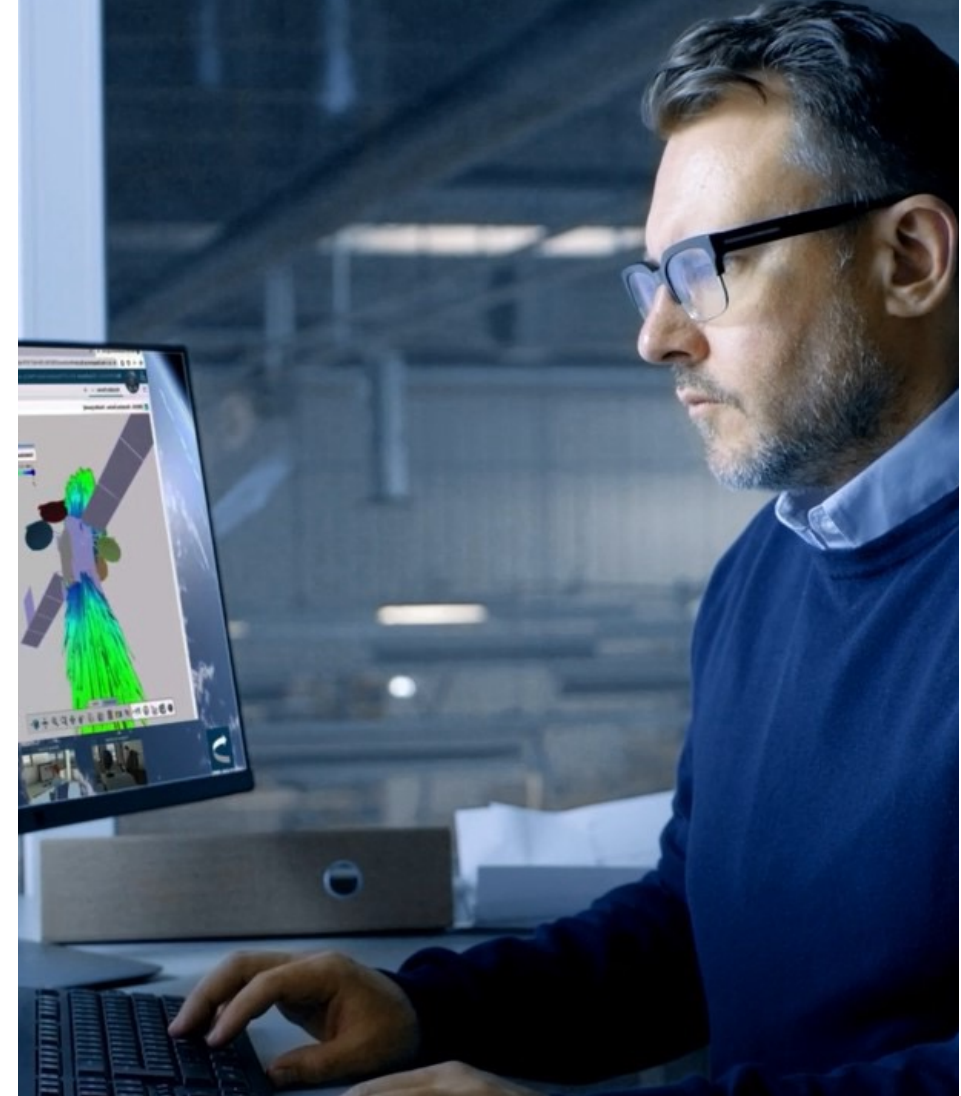
# Recognize Collaboration Challenges

## Internal Collaboration Challenges

Collaboration often seems like a simple concept, but putting it into practice operationally across the supply chain is remarkably challenging without the right processes and tools. Designers usually work independently and create silos of information that others can't access. In fact, our research shows that the most common collaboration challenge in product development is simply ensuring everyone sees the correct information.<sup>1</sup> To highlight how frequently this challenge impacts product developers, another study finds that engineers work on outdated data 28% of the time.<sup>2</sup> The study further shares that poor collaboration leads to design rework, more time spent on non-value-added tasks, and suboptimal decisions leading to design errors.<sup>2</sup> The survey goes on to share that poor collaboration impacts the business by delaying time to market, increasing development costs, increasing product cost, creating quality problems, and causing engineers to miss requirements.<sup>2</sup> Space startups cannot afford the impacts of poor collaboration.

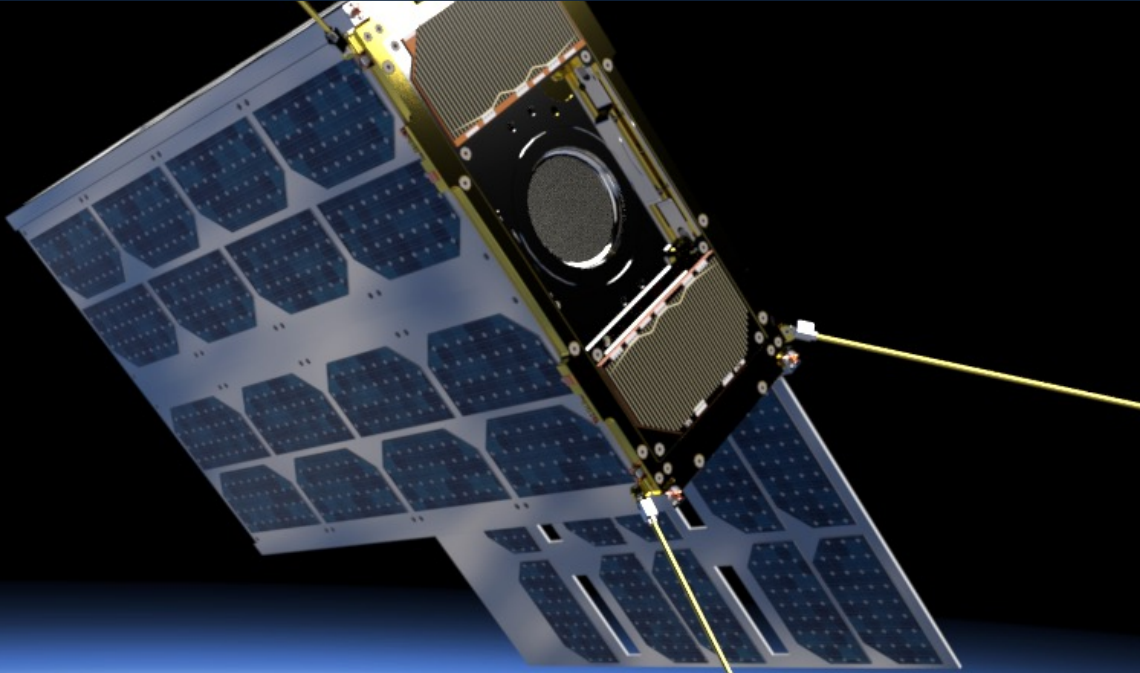
## Supply Chain Collaboration Challenges

As mentioned earlier, the space startup ecosystem is diverse. Few startups can do everything on their own. Technology and suppliers are rapidly innovating and evolving, making developing satellites, launchers, and controls a team effort. It also makes collaboration much more challenging. While one-half of companies report that collaboration within their department is "very easy" only 11% say that's true when collaborating with other companies.<sup>1</sup> Specifically, our research finds that about two-thirds of respondents report that including 3rd parties in workflows (69%), designing concurrently with them (70%), and merging their designs (62%) are somewhat to very challenging.<sup>3</sup>



With reductions in both top-line revenue and bottom-line costs, poor collaboration has a significant negative impact on profitability.<sup>2</sup>

While 41% of the general engineering population say that multi-CAD data makes collaboration hard,<sup>2</sup> our unpublished data makes us suspect that it may be even more challenging for the new space industry.



# Multi-CAD Exacerbates Collaboration Challenges

## Multi-CAD Increases Collaboration Challenges

Working across company cultures and boundaries is always challenging, but that's not the whole story when collaborating on a satellite, launch system, or other space equipment. The ecosystem in the space industry is inevitably a multi-CAD scenario. Even internally, mechanical, electrical, software, and systems engineers need specialized design and simulation tools for their disciplines. The diverse supply chain of design partners, suppliers, and customers in the space industry leads to multi-CAD challenges. Suppliers have their own design tools that may or may not match tools used internally. Even contract designers will be more comfortable and productive using the tool of their choice.

Multi-CAD makes collaborating internally and externally much more challenging due to incompatible files and data formats. While 41% of the general engineering population say that multi-CAD data makes collaboration hard,<sup>2</sup> our unpublished data makes us suspect that it may be even more challenging for the new space industry.

Collaboration is more than just sharing and opening files. Engineers need to be able to open designs from any format and see them in the full equipment context so they can identify issues and provide feedback. Ineffective multi-CAD collaboration tools make it hard or impossible to combine designs into assemblies, modify them, or reuse them. In addition, poor multi-CAD capabilities create issues and impacts, including the need to recreate designs and translate files which can lead to corrupt models, broken data relationships, and lost information. However, working with a variety of CAD tools is the reality for new space companies, and they must accommodate it.



# Operationalize Collaboration

## Enable the Collaboration Competency

Collaboration challenges point out why even small startups need to operationalize collaboration. Effectively operationalizing collaboration requires the right processes and technology. For startups the technology must be enough to make multi-domain, multi-company, multi-CAD collaboration an intrinsic part of how the company works.

There are many collaboration tools available to support general business collaboration. Space startups may leverage these, but for design collaboration, they need to work in the context of their real environment – highly complex engineering data spread across various CAD formats.

“Companies must choose a (product innovation) platform that provides the right collaboration foundation to create product innovation agility, speed, and quality. They must select a platform that supports the digital thread, allows design for “x,” enables concurrent engineering, and ensures secure partner collaboration.”<sup>4</sup>

The collaborative platform must support modern engineering approaches, including model-based design, modular development, and design digital twins. It should also support the intersection of the project, product, and the business. The platform should support a range of use cases, from supporting collaboration tasks and workflows to full project management, and offer capabilities like embedded analytics that allow product developers to manage the results in the design context.

## Collaborate in a Complex, multi-CAD environment

Space startups looking for a design collaboration platform should recognize the requirement to support configuration management, reuse, design review, and change management across domains and CAD solutions. The solutions must support digital mockups, 3D markups, and design comparisons with a combination of CAD models. It's important to note that their collaborative environment must be able to work with native and non-native CAD models, simulation, and other engineering tools.

For example, it should be able to manage simulation data from various tools, regardless of the software providers.

## Collaborate Across the Supply Chain

Collaboration also needs to accommodate the complexity of dynamic supply chains. It should be easy to onboard partners of all types, supporting partners with different trust and collaboration maturity levels. For example, it should allow some partners to work online but enable others to use secure, asynchronous data exchange.

## Reduce Collaboration Barriers with the Cloud

Lastly, let's talk about adoption. The solution must be easy to adopt and add new participants to add value. A cloud-based platform can provide secure, selective collaboration across the business and the supply chain with much lower effort to deploy and quickly include collaborators. As our collaboration research shares, companies that use the cloud for product development are more likely to report that collaboration is “very easy.”<sup>3</sup>

# Enable Innovation to Launch Space Startups

## Focus on the Mission

The time to get started is now. Succeeding in the space industry is challenging, demanding both technical and business savvy. Space startups need to be fast, innovative, accurate, and nimble to beat the competition. The current product development status quo is not sufficient.

## Enable Innovation

Space startups need the right technology to develop highly complex equipment with a diverse supply chain. They need the right tools for engineering, data, processes, projects, and collaboration to efficiently tap the innovative capabilities of their highly skilled workforce, partners, and supply chain. Ideally, they could adopt a collaborative innovation platform that supports all of these needs in an integrated way, supporting a multi-domain, multi-CAD environment and advanced needs like configuration, modularity, and digital twins.





Space startups need to be fast, innovative, accurate, and nimble to beat the competition. The current product development status quo is not sufficient. They must operationalize collaboration throughout their value network to become more innovative and efficient, meeting deadlines and budgets while delivering high quality and reliability.

# Enable Collaboration to Launch Space Startups

## Enjoy the Results

Space startups can't afford the status quo. They must operate like the Top Performers in our benchmark research. They must operationalize collaboration throughout their value network to become more innovative and efficient, meeting deadlines and budgets while delivering high quality and reliability.

Having the right collaboration platform allows them to drive world-class collaboration despite complexity. It provides engineers the ability to innovate without fear of mistakes, the confidence to make changes, and the ability to get designs right the first time. The result of their collaboration should be a complete digital thread with data continuity that captures intellectual property and provides traceability for regulators. It should also support the business, getting stakeholders on the same page and keeping them informed so they can secure funding based on confidence in their offer, reliably get their equipment into the market, and launch a profitable business to become a leader in the new space industry.

## Operationalize Collaboration

Space startups need to operationalize collaboration and make it a part of their company DNA to secure a competitive advantage. Although space startups may have selected their design tools, they still need to support their collaboration needs by adopting the right collaborative platform. Their solution of choice should securely get the right data to the right person, at the right level of detail, at the right time. It should enable digital mockups, 3D markups, and design comparisons with a combination of CAD models. And it must be able to do this in the complex, multi-CAD environment in which most space startups operate. Lastly, the platform should be easy to adopt and securely add collaborators leveraging cloud technologies.

# Acknowledgements



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## About the Author

Jim Brown founded Tech-Clarity in 2002 and has over 30 years of experience in the manufacturing and software industries. Jim is an experienced researcher, author, and speaker and enjoys engaging with people with a passion to improve business performance through digital enterprise strategies and supporting software technology.

Jim is actively researching the impact of digital transformation and technology convergence in the manufacturing industries.



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## References

1. Jim Brown, Leveraging the Cloud for CAD and Product Development Collaboration, Tech-Clarity, 2021.
2. Michelle Boucher, What's the Cost of Poor Collaboration?, Tech-Clarity, 2020.
3. Jim Brown, Accelerating Product Development with the Cloud, Tech-Clarity, 2020.
4. Jim Brown, Choosing the Right PLM for Multi-Enterprise Collaboration, Tech-Clarity, 2022.

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