

1. FROM TECHNOLOGICAL TO ECONOMIC STAGNATION

The rapid financial growth enjoyed by Near Space industry activities in the Earth orbits is driven by changes in market dynamics rather than technological breakthroughs. The shift towards privatization has resulted in a transition from the initial phase of exploration to an era of exploitation. Now that space is becoming commercial, financed by true business opportunities and profitability goals rather than institutional capital, it is increasingly hard to promote an ecosystem of innovation. Inevitably, technological stagnation will lead to financial plateauing.

2. DISRUPTIVE TECHNOLOGICAL INNOVATIONS

There has been a preponderance of incremental improvements to legacy systems and a lack of disruptive technologies (DTs) in the Near Space ecosystem. DTs are innovations that create new opportunities and value networks and eventually displace established market-leading firms, products, and alliances. A characteristic of DTs is the initial inferiority compared with the existing design, which leads to incumbents overlooking their potential and failing to invest in them.

3. SPACE SECTOR CHARACTERISTICS

The lack of exploratory activities is an inevitable product of external conditions. Space is a hostile domain that is hard to operate in, and environmental factors lead to burdensome system requirements. Reaching space is also expensive, a reality augmented by the low volume demand compared to terrestrial mass markets which entails long break-even timeframes and a wide *valley of death*. Finally, the *demand pull* model of the space sector, where mission-specific technological developments are the drivers of innovation, discourages the pursuit of novel scenarios in which there would be a need for DTs.

DISRUPTIVE INNOVATIONS IN SATELLITE MISSIONS

A MANAGERIAL PERSPECTIVE



4. STRATEGIC ALLIANCES FOR INNOVATIVE OUTCOMES

In high-technology industries a single company rarely has the full range of capabilities needed to devise cost-effective and timely innovations. The optimal way to reduce R&D costs, lessen the risks of novel products, and access know-how not available internally is through strategic alliances: agreements between organizations to share their inputs while maintaining their own corporate identity. Strategic alliances positively influence the innovative capabilities of organizations and can serve a radar function to spot high-potential technologies.

5. AUTOMATION AND A.I. IN THE SATELLITE MARKET

The satellite market is one of the space sector verticals closest to maturity and at highest risk of financial plateauing. Today, most satellites are still controlled by operators on the ground, making missions inefficient and expensive. Automation and A.I. have the potential of overhauling the widespread legacy operational systems and making satellites independent from ground control. From case-specific solutions such as onboard cloud detection to complete spacecraft automation, these technologies will slash mission costs and enable new mission concepts, furthering the potential for the industry's economic growth.

6. STRATEGIES FOR OPERATORS AND MANUFACTURERS

The constrained resources of *New Space* firms make internally financed investments in non-core activities unreasonable. The field of AI is constantly progressing, so a dedicated and highly skilled team would be necessary to simply stay on par with the state of the art. To avoid losing the weighty automation opportunity, market participants must engage in strategic alliances with providers of such high-potential solutions. If this course of action is not taken soon, satellite operators and manufacturers are at risk of technological lockout and of loss in competitiveness.