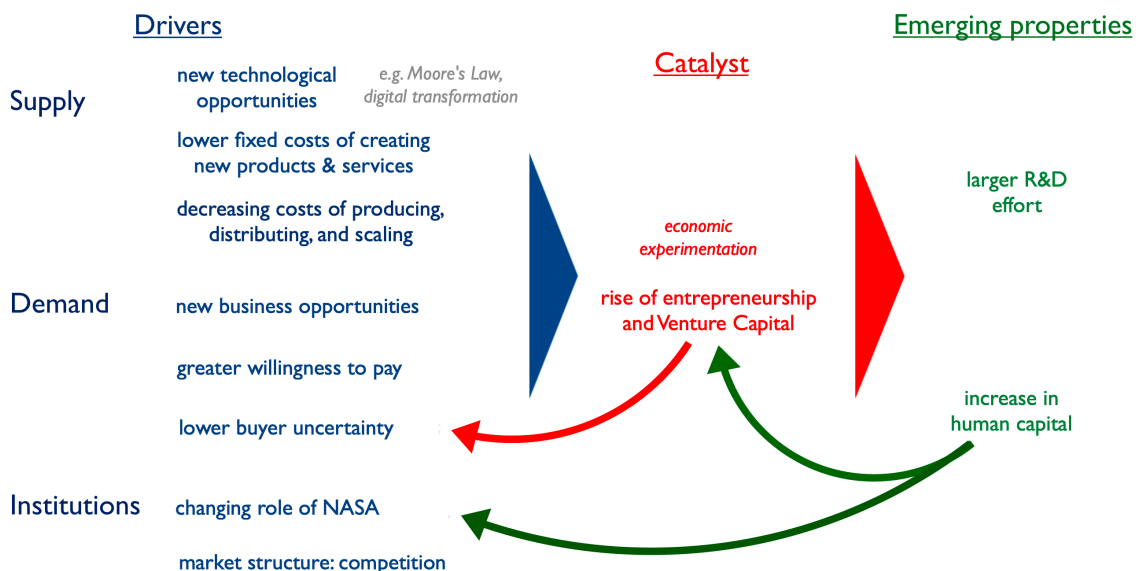


## *Practitioner implications to Defining innovatisation:* **the case of NewSpace and the changing space sector**

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**Summary of the paper:** The space sector has become far more dynamic and innovative, with new actors (e.g., start-ups, venture capital) entering and the ever-growing importance of private firms. In this paper we introduce a novel concept, *innovatisation*, to understand this phenomenon. Innovatisation describes the transformation of a sector between two modes. In a mode of *technological achievements* (TA), neither consumers nor costs really count, nor again science, but only technological performance; in *innovation*, customer preferences, commercial opportunities, and costs become essential. Studying the economics of Apollo and the commercialisation attempts of the 1980s, we show how the space sector has long featured a logic of TA. Then, analysing recent trends, we provide quantitative empirical evidence (e.g., costs) that innovation now shapes the sector: building on Jones (2022), we identify the driving forces behind the innovatisation of the space sector, forces that are further supported by the rise of entrepreneurship and venture capital; we then discuss the emergence of two properties of the space sector, with the rise of R&D inputs (expenditures and human capital) as a result of these changes.

### Innovatisation in the space industry



As shown in the figure above, the 8 driving forces can be categorized as demand (3), supply (3), and institutional (2); a catalyst and 2 emerging properties also contribute.

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### **Implication 1: Vigilance! Space is undergoing a dynamic, profound, and durable transformation**

First, the big picture: as established in the research paper, the sector is undergoing a profound transformation - of a type likely unprecedented, at a speed rarely observed. This unleashes potent economic forces for the first time: competition, rapid corporate growth and positive feedback loops, and many new markets and product developments. The industry transformation is likely one-way and durable, and can perhaps be summarized as a higher “clockspeed” – from the decades-long cost-plus contracts common in aerospace & defense, to the quarterly product updates common in software and IT. When industries change rapidly, adaptation and vigilance are key. Firms that do well in steady-state sectors often do not in highly dynamic ones, and vice-versa.

### **Implication 2: There is a “before” and “after” innovatisation - and your organization’s core capabilities (and people!) may need to change**

Pre-innovatisation, in an era of “technological achievements” like Apollo and the International Space Station, successful sales were driven by adept government relations, lobbying, and tendering and proposal experts with deep experience of government processes. Good links to other similarly-endowed organisations was also a plus, for larger projects requiring partners. Having excellent “operations” meant R&D teams making a few top-spec, handmade, customized artefacts, with failure often unpalatable – and knowledge of detailed standards key. A proven record of excellence in turn further boosted government sales. Speed, cost, and recurring production costs were clearly secondary at best. Thus experts in high-quality engineering and government relations were key.

In the new era of innovatisation, the biggest winners so far have core capabilities in rapid, “fail-fast” product development, agility, and creating innovative business models – not to mention attracting and retaining top talent, including from outside space. For the winners, capabilities in “normal” sales including directly to consumers, speed-to-market, and unit costs and scaling are crucial. In sum, the most innovative actors in space are far closer to the IT / software mindset – with the people to match.

### **Implication 3: It is far cheaper and easier to experiment new space businesses, due to technology, mindsets, and government support**

Several factors have combined to make it *much* easier to “just try” space business ideas, including those requiring hardware launch. Managers in all tech-related fields are used to decreasing costs, usually linked to software and electronics. Yet a momentous change in space, is the slashing costs to develop new products – including satellites – enough to test a business. Nanosatellites, their standardization, and ease of launch (not to mention plentiful young engineers trained on them) allow testing technology at a fraction of prior costs, and constellations allow testing entire businesses incrementally. The boost in the launch supply also removes a key bottleneck. On the demand side, equally important is increased acceptance (or lower uncertainty) of some key innovations. Think nanosatellites’ usefulness in practice, or the capacity of private enterprise to develop its own launcher. These are also enabled by a recent sharp increase in human capital in the sector. This change in mindset to a greater acceptance of innovative concepts should not be overlooked by managers. Finally, while government is likely to remain a key actor in space, its role will evolve, as it expends effort to encourage business experimentation, and becomes a customer among many buying “off-the-shelf”. Forward-looking managers would do well to be part of this positive change, not the inertia.