

What Failure Costs

Ecosystem support and the space companies that didn't get it — a verified retrospective ·
October 02, 2026

7	4	1,031+	\$3.2B → \$36.5M	~230
FAILURES DOCUMENTED	RESCUE COUNTERFACTUALS	JOBS LOST (VERIFIED COUNTS)	VIRGIN ORBIT VALUATION TO AUCTION	CLAIMS FETCHED & VERIFIED

The finding in one sentence

Across seven collapses and four rescues, the companies did not differ nearly as much as their ecosystems did: every failure traces to a **single missing resource at a specific moment** — a bridge loan, a lead investor, an anchor order that paid — and every rescue is the same story with the resource arriving. Each claim below survived adversarial verification against primary documents; absence claims were admitted only where an administrator, filing, or the company itself stated the gap.

1. A government contract is not a rescue

Kleos Space held a US National Reconnaissance Office contract (Stage One, Sep 2022; stage-two extension Apr 2023) and still filed for bankruptcy ninety days later, when its sole lender, PURE Asset Management, would — in its own words — 'no longer extend additional credit' and no 'viable alternative financial accommodation' existed. 2022 revenue: EUR 272K against an EUR 11.3M loss; the award could not convert to revenue inside the runway. **Vector Launch** won its first-ever US Air Force mission (ASLON-45, \$3.4M) on August 6, 2019 — and paused operations on August 9, three days later, when Sequoia's 'abrupt and unexplained withdrawal ... made it impossible to raise additional capital' (Vector's own bankruptcy documents). **Masten** held a \$75.9M NASA CLPS award and died of it: fixed-price, \$10–30M over budget, with a ~\$60M growth raise that 'never found a lead investor.' The award is necessary. The capital ecosystem around the award is what keeps it alive.

2. Capital without anchor demand dies just as surely

Virgin Orbit raised more than anyone on this list — \$228M SPAC proceeds, a \$160M PIPE, Branson/Mubadala/Boeing on the roster — and liquidated for ~\$36.5M against a \$3.2B listing valuation. The verified gaps are demand-side: it lost the TacRS responsive-launch award to Firefly, flew two missions a year against the twelve its cost base needed, and when the end came Branson was 'unwilling to fund the company further.' **Reaction Engines** had BAE, Rolls-Royce and Boeing as shareholders and GBP 60M of UK public development money across four decades of SABRE work — and failed a ~GBP 20M emergency raise with 'insufficient backing from existing shareholders'; the strategics declined the bail-out. Blue-chip cap tables do not substitute for orders that pay on a schedule.

3. The kill mechanism is single-point dependence

Name the failure and you can name the single thread it hung from: Kleos — one lender. Vector — one lead VC. Masten — one fixed-price award. OneWeb (pre-rescue) — one anchor investor (SoftBank declined the follow-on in the COVID window). Terran Orbital — one customer whose \$2.4B backlog never paid (Rivada;

backlog restated from \$2.7B to \$312.7M, going-concern doubt with \$14.6M cash). LeoSat booked ~\$2B in customer pre-commitments and still folded when its two strategic shareholders changed strategy — demand on paper could not be financed. An ecosystem map that cannot see concentration — one lender, one lead, one program, one customer — cannot see the next failure coming.

4. The counterfactuals: same companies, support arrived

OneWeb hit Chapter 11 in the same financing winter that killed others — and was bought out of it by the UK Government (\$500M, with an explicit sovereign-capability rationale and a national-security special share) plus Bharti (\$500M). The constellation was completed; even SoftBank returned with \$350M. **Firefly** is the thesis in one company: furloughed all 159 staff in 2016 when an anchor investor abandoned half its Series A, was auctioned in 2017 — then, re-capitalized, won a \$93.3M NASA CLPS order and delivered the first fully successful commercial lunar landing (Blue Ghost, Mar 2025), executed the Space Force's 27-hour VICTUS NOX responsive launch, and IPO'd at \$868M. **Terran Orbital** was rescued by the strategic customer that needed its buses (Lockheed: \$30M bridge, then acquisition). **Relativity** found one patient principal (Eric Schmidt) and promptly signed SES. The companies did not change. The support did.

5. The bill

Documented job losses across the failures alone: **1,031+** (Virgin Orbit 675, Reaction Engines 173 of 208, Vector ~150, Masten 20, LeoSat 13 — several counts were never disclosed). Public money stranded with the companies: the UK's GBP 60M SABRE commitment ended with ESA reportedly unable to secure full design rights and a EUR 7M INVICTUS program re-hiring the scattered team; Spaceport Cornwall's public package lost its anchor tenant; Luxembourg's agency grant and prestige listing ended in an unconcluded asset sale. Spectrum rights — Audacy's first-of-kind FCC relay license, LeoSat's ITU priority — were surrendered or sold for cents (Audacy's assets: ~\$6.7M to EOS Defense Systems). Virgin Orbit's \$3.2B of listed value returned ~1 cent on the dollar at auction.

Why this argues for the resources this atlas maps

Every layer of the atlas corresponds to a resource whose absence appears, verified, in a bankruptcy filing above. **Demand timing** (the radar): Kleos and Vector died in the gap between award and revenue — runway-vs-window is a computable warning. **Capital depth and co-investment**: HawkEye 360 — same NRO program as Kleos, \$302M raised — is the control group; single-lender and single-lead concentration is visible in the graph before it is fatal. **Incentives and landing support**: the one failure column that is nearly empty. Of seven failures, almost none carried a documented state package — Kleos's Denver landing had engagement but no financial incentive on record; Masten and Vector had none worth the name. The rescue column, by contrast, is sovereign and strategic money arriving on purpose. Regions that want the Firefly ending rather than the Kleos ending are arguing about exactly the resources on these pages — and the ledger behind this report (FAILED_COMPANIES.md) now tracks every new failure so the comparison keeps compounding.

Method: 10 research/verification agents; ~230 evidence-bearing claims; every URL fetched; dollar figures matched to page; absence claims admitted only when stated by an administrator, filing, or the company. Unverifiable claims were removed, including two state-incentive figures that could not be re-fetched.

Case files

Kleos Space S.A. · Luxembourg · bankruptcy 2023-07

Space-based RF reconnaissance data-as-a-service: 16 smallsats in four clusters detecting and geolocating radio-frequency transmissions (maritime/defence intelligence); A...

HAD	VERIFIABLY LACKED
state-incentive — Luxembourg government MoU under the SpaceResources.lu initiative with LuxIMPULSE national spac... capital — ASX IPO: A\$11 million at 20c a share, prospectus open 7-21 June 2018, listing 9 July 2018; at... agency-program — Luxembourg Space Agency EUR 1M (~US\$1.1M) non-equity grant for RF-reconnaissance data-product... (\$1,100,000) capital — Placement of A\$19M (EUR 11.7M / US\$13.8M) at A\$0.72/CDI announced 11 November 2020 after the S... (\$13,800,000) capital — Placement of EUR 7.8M (A\$12.6M, ~14,823,529 CDIs) at A\$0.85/CDI with cornerstone investors Per... capital — Four-year secured A\$10M debt facility from PURE Asset Management (announced 6 July 2022) to ex... gov-contract — NRO Strategic Commercial Enhancements (SCE) BAA commercial-RF study contract (first stage: ana...	• Bridge financing / lender forbearance at the moment of cash exhaustion • Equity capital at scale - public-market investors unconvinced the satellites were working • Anchor demand converting to revenue inside the company's runway (US and allied government data purchases at scale)
AFTERMATH	No concluded sale as of the company's October 2024 update: regulatory work 'aimed at facilitating the sale of the Company's assets' had been ongoing since Augu...

LeoSat Enterprises · USA/Luxembourg (Gunter's Space Page lis... · shutdown 2019-11 · 13 jobs lost

Planned 78-108-satellite Ka-band LEO constellation with four optical inter-satellite links per spacecraft - a 'fiber-in-space' premium data network for corporate and gov...

HAD	VERIFIABLY LACKED
strategic-investor — SKY Perfect JSAT (Japan) investment announced May 2017 (amount undisclosed in fetched sources;... strategic-investor — Hispasat (Spain) investment, 2018 (amount undisclosed in fetched sources) infrastructure — Thales Alenia Space manufacturing partnership (ELiTeBus-1000 design) and the priority ITU Ka-b... customer-commitments — Pre-commitment orders of some \$2 billion captured before collapse (Advanced Television: 'succe... (\$2,000,000,000)	• Completion of its Series A by the strategic shareholders - patient strategic capital • Replacement anchor investors for a EUR 3B-class constellation • Investor-acceptable procurement freedom - the spectrum came shackled to a captive supplier
AFTERMATH	Nothing launched; all planned satellites (up to 108) cancelled per Gunter's Space Page; the priority Ka-band ITU filing (held by Thales Alenia Space) was left...

Audacy Corporation · USA (Silicon Valley - San Francisco Bay... · shutdown 2019

Commercial inter-satellite data-relay network: three large MEO satellites plus San Francisco and Singapore ground stations selling real-time downlink, continuous monitor...

HAD	VERIFIABLY LACKED
infrastructure — FCC spectrum license (granted 4 June 2018) for the world's first commercial inter-satellite da... customer-commitments — Pre-service commercial agreements valued at more than \$100 million - more than half with US-ba... (\$100,000,000)	• Growth capital to build the constellation after the demo satellite was lost
AFTERMATH	EOS Defense Systems USA (Huntsville, AL subsidiary of Australia's Electro Optic Systems) agreed on 28 Jan 2020 to acquire Audacy's business, assets and FCC spe...

Vector Launch · United States (Tucson, Arizona) · bankruptcy 2019-12 · 150 jobs lost

Vector-R small launch vehicle for microsatellites (advertised from ~\$1.5M per launch) plus GalacticSky software-defined satellite platform

HAD	VERIFIABLY LACKED
capital — Series B of \$70M (Oct. 19, 2018) led by Kodem Growth Partners with Morgan Stanley Alternative... (\$70,000,000) capital — More than \$100M in total venture-capital investment attracted (\$100,000,000) gov-contract — U.S. Air Force Space and Missile Systems Center ASLON-45 launch contract - \$3.4M, awarded Aug... (\$3,400,000) agency-program — Technology development contracts from both NASA and DARPA; at the Aug. 2019 pause, Vector said...	• Continued lead-investor backing to close its third venture round - no other capital source could replace the lead VC on... • Anchor government demand in time to matter: its first-ever Air Force launch contract (\$3.4M ASLON-45) arrived Aug. 6, 2... • Bridge financing to survive the funding shock: nothing stood between the VC withdrawal and the secured lenders' sweep o...
AFTERMATH	Lockheed Martin agreed to buy the GalacticSky software-defined-satellite assets for a \$4.25M stalking-horse base price (Feb. 2020 auction process), after also...

Masten Space Systems · United States (Mojave, California) · bankruptcy 2022-07 · 20 jobs lost

Vertical-takeoff/vertical-landing (VTVL) reusable rockets and lunar landers; 600+ VTVL test flights since 2004; XL-1/Xelene lunar lander under NASA CLPS

HAD	VERIFIABLY LACKED
gov-contract — NASA Commercial Lunar Payload Services (CLPS) task order, April 2020: Masten Mission One, XL-1... (\$75,900,000) agency-program — NASA Flight Opportunities Program - since 2011 Masten flew NASA-sponsored payloads on its VTVL... agency-program — COVID-related NASA payment of \$1.4M (Feb. 2022) under the broader federal disaster relief prog... (\$1,400,000)	• Private growth capital to stand behind the NASA award: a ~\$60M raise attempted from early 2021 never found a lead inves... • Coverage of the full mission cost by the CLPS award itself: NASA's payment did not cover the lander mission, and the co...
AFTERMATH	Astrobotic (Pittsburgh) acquired Masten - its full 18-year technology portfolio and Mojave VTVL/propulsion test operations - for \$4.5M in the bankruptcy sale (...)

Virgin Orbit · United States (Virgin Group/UK-founded... · bankruptcy 2023-04 · 675 jobs lost

Air-launched small-satellite launch: LauncherOne rocket dropped from a modified Boeing 747 (Cosmic Girl); 6 missions flown, 4 successes, 33 satellites orbited

HAD	VERIFIABLY LACKED
capital — SPAC merger with NextGen Acquisition Corp. II (approved Dec 28, 2021; NASDAQ: VORB) valuing th... (\$228,000,000) strategic-investor — Fully committed \$160M PIPE (Via Satellite: '160 million from a fully committed PIPE'); CNBC p... (\$160,000,000) gov-contract — VOX Space (Virgin Orbit subsidiary) \$35M U.S. Space Force contract - first round of launches u... (\$35,000,000) state-incentive — California state training reimbursement subsidy to Virgin Orbit LLC (Subsidy Tracker, Good Job... (\$407,864) state-incentive — California state training reimbursement subsidy to Virgin Orbit LLC (Subsidy Tracker, Good Job... (\$55,645) capital — \$31.6M debtor-in-possession financing commitment from Branson's Virgin Investments Limited to... (\$31,600,000)	• Anchor national-security launch demand: despite half its missions flying Space Force satellites, it lost the Tactically... • Launch demand/cadence sufficient to generate revenue: needed ~12 launches a year for profitability at a ~\$50M/quarter b... • Expected public-market capital: SPAC redemptions delivered less than half the planned proceeds, shortening its runway f... • Patient anchor-investor capital and rescue/bridge financing after the January 2023 UK launch failure
AFTERMATH	Bankruptcy auction May 22, 2023 (~\$36.5M total vs \$3.2B SPAC valuation): Rocket Lab bought the Long Beach factory, machinery and lease for \$16.1M (for Neutron...

Reaction Engines Limited · United Kingdom · administration 2024-10 · 173 jobs lost

SABRE synergetic air-breathing rocket engine and precooler heat-exchanger technology for hypersonic flight and space access (founded 1989, Oxfordshire)

HAD	VERIFIABLY LACKED
agency-program — GBP 60 million in funds from the UK Space Agency and ESA, announced July 2016 at the Farnborou... strategic-investor — BAE Systems GBP 20.6 million investment for a 20% equity stake, as part of an agreement to hel... capital — Series B of \$37.3 million joined by Boeing HorizonX Ventures, Rolls-Royce plc and BAE Systems... (\$37,300,000) strategic-investor — Rolls-Royce GBP 20 million investment as part of a strategic partnership (August 2020) gov-contract — DARPA contract (September 2017) to test the HTX precooler test article at temperatures exceedi... agency-program — UK Space Agency grant of GBP 3.9 million (\$5 million) in 2021 to support development of SABRE... (\$5,000,000) capital — GBP 40 million investment round completed in 2023; total raised over the company's life exceed...	• Emergency bridge financing: the ~GBP 20 million rescue raise failed • Bail-out capital from its strategic aerospace investors: BAE Systems and Rolls-Royce declined to provide emergency capi... • Sustaining commercial revenue ahead of the raise: revenue growth ran below plan, making additional funding essential
AFTERMATH	Precooler technology carried into ESA's EUR 7 million INVICTUS Mach 5 testbed programme led by Frazer-Nash Consultancy (with Spirit AeroSystems and Cranfield U...

Rescue counterfactuals

OneWeb · United Kingdom · rescue(survived) 2020-03 · 451 jobs lost

LEO broadband megaconstellation (648-satellite first generation) for global internet connectivity

HAD	VERIFIABLY LACKED
capital — Cumulative venture/strategic capital of \$3.4B from SoftBank (~\$2B), Virgin Group, Qualcomm, Ai... (\$3,400,000,000) strategic-investor — SoftBank as anchor investor since 2016 with ~\$2B committed (\$2,000,000,000) infrastructure — OneWeb Satellites 50-50 manufacturing JV with Airbus: 105,500 sq ft high-rate factory at Explo... capital — RESCUE: UK Government \$500M equity stake, with the government retaining 'a final say over any... (\$500,000,000) strategic-investor — RESCUE: Bharti Global matching \$500M, contributing commercial/operational leadership and Bhart... (\$500,000,000) capital — POST-RESCUE: SoftBank returned alongside Hughes Network Systems with a combined \$400M investme... (\$400,000,000)	• Patient capital at the moment of need — the anchor investor refused the next round • Bridge financing through the COVID-19 market shock
AFTERMATH	Company survived intact: sold to UK Government + Bharti consortium (announced July 3, 2020); constellation completed for global coverage; all-share combination...

Firefly (Firefly Space Systems -> Firefly Aerospace) · United States · rescue(survived) 2016-09 · 159 jobs lost

Small/medium launch vehicles (Alpha, later Eclipse) and Blue Ghost lunar landers; HQ Cedar Park, Texas

HAD	VERIFIABLY LACKED
agency-program — NASA Venture Class Launch Services (VCLS) contract, originally \$5.5M, later reduced by \$2.4M (\$5,500,000) gov-contract — DARPA contracts totaling approximately \$3M (aerospike engine and composite tank work) (\$3,000,000) capital — Series A: \$19.1M raised of a planned \$38.2M round (SEC filing, June 2016) (\$19,100,000) strategic-investor — RESCUE: Max Polyakov's Noosphere Ventures acquired the assets at the March 2017 foreclosure au... agency-program — POST-RESCUE: NASA CLPS task order for Blue Ghost Mission 1 lunar delivery (10 payloads to Mare... (\$93,300,000) gov-contract — POST-RESCUE: US Space Force VICTUS NOX Tactically Responsive Space (TacRS) mission — Alpha lau... strategic-investor — POST-RESCUE: Northrop Grumman \$50M investment (announced May 29, 2025) to accelerate Antares 3... (\$50,000,000) capital — POST-RESCUE: Nasdaq IPO, Aug 7, 2025 — \$868M raised at \$45/share; stock closed +34% at \$60.35... (\$868,000,000)	• Completion of its Series A — the anchor investor withdrew at the final moment • Replacement or bridge capital — only limited founder and existing-investor funds were available
AFTERMATH	Noosphere Ventures acquired virtually all assets at the March 2017 foreclosure auction organized by EOS Launcher and renamed the entity Firefly Aerospace; afte...

Terran Orbital · United States · rescue(survived) 2024-08

Small-satellite buses and constellations (Tyvak); bus supplier for Space Development Agency tranches via Lockheed Martin

HAD	VERIFIABLY LACKED
strategic-investor — Lockheed Martin held ~30% equity via its venture capital unit and accounted for 71% of Terran'... gov-contract — Space Development Agency bus production (as Lockheed subcontractor): 10 Tranche 0 Transport La... anchor-contract — Rivada Space Networks agreement (announced Feb 22, 2023): \$2.4B for 288 operational LEO satell... (\$2,400,000,000) state-incentive — Space Florida partnership (announced Sept 27, 2021): property lease, building financing and de... capital — RESCUE BRIDGE: 'Lockheed Martin and other Terran creditors establishing a \$30 million working... (\$30,000,000) strategic-investor — RESCUE: Lockheed Martin acquisition at \$0.25/share, ~\$450M enterprise value including debt ret... (\$450,000,000)	• Going-concern capital — cash to operate for twelve months • A paying anchor customer — the \$2.4B Rivada backlog never converted to cash
AFTERMATH	Lockheed Martin: Terran Orbital and subsidiary Tyvak International now operate within Lockheed Martin's Space business area (closed Oct 30, 2024; ~\$450M enterp...

Relativity Space · United States · rescue(survived) 2025-03

3D-printed launch vehicles: Terran 1 (retired after one flight) and the reusable medium/heavy Terran R targeting first launch in late 2026

HAD	VERIFIABLY LACKED
capital — Series E, June 8, 2021: \$650M led by Fidelity with Baillie Gifford, BlackRock, Centricus, Coat... (\$650,000,000) infrastructure — Launch Complex 16 at Cape Canaveral as Terran R launch site anchor-contract — Nearly \$3B in customer launch contracts struck for Terran R ahead of first flight strategic-investor — RESCUE: Eric Schmidt's controlling investment, announced March 10, 2025 — a 'significant inves... anchor-contract — POST-RESCUE: SES multi-year, multi-launch Terran R services agreement (Nov 12, 2025), expandin...	• Follow-on private capital to carry Terran R development to first flight
AFTERMATH	No asset transfer — control passed to Eric Schmidt via his controlling stake; company continues as Relativity Space