

BUY THE RUMOR, SELL THE NEWS

Science, Hype and the Business Value of Unverified Technology

How scientific information becomes speculation, how technological narratives create value before evidence exists, and why scientific due diligence is becoming a strategic corporate capability

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Abstract

“Buy the rumor, sell the news” is one of the oldest expressions in financial markets. In science-driven industries, however, the aphorism describes something considerably more consequential than speculative trading psychology.

Biotechnology, artificial intelligence, advanced materials, energy technologies, medical diagnostics, synthetic biology, quantum computing and other deep-tech sectors increasingly operate within an information environment in which a scientific claim can acquire significant economic value long before it has been independently reproduced, technologically validated, industrially scaled, regulatorily accepted or commercially proven.

This creates what this article proposes to call the Evidence-to-Valuation Gap (EVG): the informational and temporal distance between the maturity of the evidence supporting a technology and the economic value that markets, investors or companies begin attributing to it.

Documented cases show the magnitude of the phenomenon. Theranos raised more than \$700 million while the US Securities and Exchange Commission alleged systematic exaggeration or misrepresentation of its technological capabilities. Nikola agreed to pay \$125 million to settle SEC fraud charges concerning representations about technological and commercial achievements. During the COVID-19 emergency, a single announcement from SCWorx concerning supposedly committed orders for diagnostic tests caused its shares to rise 425% in one trading day, on volume exceeding its preceding average by more than 900 times.^[3, 5, 6]

Other episodes are scientifically very different and should not be confused with fraud. The LK-99 room-temperature-superconductor claim triggered extraordinary scientific and financial attention before replication work demonstrated that the material was not a room-temperature superconductor.^[8]

The problem is not simply “fake news”. It is a structural collision between the speed of information, the speed of capital and the necessarily slower speed of scientific verification.

KEY FINDINGS

- Narratives can acquire economic value before the underlying technology has crossed basic thresholds of replication, scale-up or regulatory validation.
- Technological failure, scientific uncertainty, hype, misinformation and fraud are distinct categories and should never be conflated.
- Press releases, institutional communications and investor relations can amplify claims before journalists or social networks enter the chain.
- Patents, prototypes and peer-reviewed papers are evidentiary milestones, not warranties of industrial or commercial success.
- Scientific due diligence is increasingly a corporate-governance and capital-allocation capability, not merely an R&D function.

1. Science and markets operate on different clocks

Scientific knowledge is intentionally slow. A credible technological proposition normally progresses through successive layers: hypothesis, experimental observation, methodological scrutiny, statistical evaluation, replication, mechanistic understanding, prototype development, engineering validation, scale-up, regulatory evaluation, commercial deployment and economic validation.

The information economy works differently. A preprint can become global news within hours. A CEO can publish a technological claim instantly. A conference demonstration can circulate worldwide before independent engineers

inspect the system. A patent announcement can be interpreted as evidence of technical maturity. A laboratory observation can become an investment theme before anyone has attempted industrial production.

Scientific validation has latency. Narrative valuation does not.

A large MIT-led study of approximately 126,000 information cascades found that false news travelled farther, faster, deeper and more broadly than truthful information. False stories were around 70% more likely to be retweeted, while truthful stories took approximately six times longer to reach 1,500 people. The study was not specific to technology investment, but it demonstrates an informational mechanism directly relevant to innovation: novelty has transmission value independently of truth value.^[1]

FIGURE 1. THE TECHNOLOGICAL AMPLIFICATION CHAIN



At every transition, uncertainty may be compressed while commercial significance expands.

Figure 1. The technological amplification chain. Conceptual framework proposed in this article.

2. The first mistake: treating every technological failure as deception

Scientific and technological development inherently involves failure. Most exploratory hypotheses will not become products. Many preclinical findings will not survive clinical testing. Materials demonstrating attractive laboratory characteristics may prove impossible to manufacture economically. Algorithms may perform impressively against benchmark datasets but fail under real-world distribution shifts. Manufacturing processes successful at kilogram scale may become unstable at tonnes per hour.

These are not necessarily scandals. They are innovation.

Scientific uncertainty: The available evidence remains insufficient and that uncertainty is appropriately acknowledged.

Scientific error: Researchers reach a conclusion honestly but subsequent evidence demonstrates that it was wrong.

Technological hype: Genuine findings are communicated with a degree of significance, certainty or commercial readiness not justified by the evidence.

Misinformation: Inaccurate information is disseminated without necessarily implying deliberate intent to deceive.

Disinformation or fraud: Deliberate or materially misleading representations are made despite knowledge, or legally relevant disregard, of contradictory evidence.

LK-99, Theranos and an unsuccessful pharmaceutical clinical trial are therefore not epistemically equivalent events. That distinction is essential. Otherwise, criticism of technological misinformation risks becoming technologically illiterate itself.

3. The technological rumour factory

The transformation of preliminary science into financially meaningful narrative normally occurs through a chain of amplification. At each transition, information may gain simplicity, certainty and commercial significance while losing context and methodological qualification.

A statistically significant observation becomes an “effect”. An effect becomes a “breakthrough”. A breakthrough becomes a “platform”. A platform becomes a “disruptive technology”. A disruptive technology becomes a projected addressable market worth billions.

This distortion is not merely a social-media problem. A BMJ study examined 462 university press releases associated with peer-reviewed biomedical research and 668 related news stories. Relative to the underlying papers, 40% of relevant press releases contained exaggerated behavioural advice, 33% exaggerated causal conclusions and 36% exaggerated extrapolation to humans. When press releases exaggerated causality, 81% of associated news stories contained similar exaggeration, compared with 18% when the press release did not. For exaggerated human extrapolation, the figures were 86% and 10%.^[2]

Misinformation can enter the communication chain before the journalist, investor or social-media user ever sees the research.

4. Authority laundering

One of the most powerful mechanisms in technological hype can be described as authority laundering. Information gains apparent credibility by progressively accumulating institutional labels: “university research”, “peer reviewed”, “patented”, “scientifically validated”, “clinically tested”, “AI-powered” or “supported by leading scientists”. Each label may contain some truth while communicating considerably more certainty than the evidence supports.

Patents deserve particular attention. Under the European Patent Office guidelines, patentability requires, among other elements, an invention susceptible of industrial application, novelty and inventive step, together with adequate disclosure and other legal requirements. A patent therefore establishes an intellectual-property position under defined criteria; it does not establish clinical effectiveness, regulatory authorisation, economic manufacturing, competitive superiority or customer demand.^[13]

“Patented technology” is an intellectual-property statement, not a certificate of commercial truth.

5. Theranos: monetising technological opacity

Theranos provides perhaps the clearest modern example of the economic power of an extraordinary technological narrative. The proposition was compelling: extensive diagnostic testing from extremely small blood samples using proprietary technology.

According to the SEC, Theranos, Elizabeth Holmes and Ramesh Balwani raised more than \$700 million from investors through false or exaggerated statements about the company’s technology, business and financial performance.^[3]

The later criminal proceedings provide an important evidentiary distinction. A federal jury convicted Holmes of one count of conspiracy to commit fraud on investors and three counts of investor wire fraud involving transfers exceeding \$140 million. She was acquitted on the patient-related conspiracy count and three patient fraud counts; the jury did not reach verdicts on three other investor counts. Holmes was sentenced to 135 months in federal prison.^[4]

Theranos illustrates a paradox. The more technically complex and proprietary a technology becomes, the harder outsiders find it to evaluate directly. Investors may then substitute proxies for technical evidence: prestigious board members, founder charisma, elite investors, press coverage, commercial partnerships, patents, confidentiality and rapidly increasing valuation.

People may believe the technology because sophisticated investors invested, while sophisticated investors partly believe because other sophisticated people appear to believe.

6. Nikola: demonstration is not capability

Nikola exposed another recurrent technological fallacy: a demonstration is not an industrial capability.

The SEC stated that Nikola agreed to pay \$125 million to settle charges that it defrauded investors by misleading them about its products, technical advancements and commercial prospects. The regulator identified representations concerning technological milestones, in-house production capability, hydrogen production, truck reservations and orders, and financial expectations.^[5]

The US Department of Justice later documented that founder Trevor Milton was convicted of securities and wire fraud and sentenced to four years in prison. Prosecutors described false statements concerning a supposedly fully functioning semi-truck prototype, in-house vehicle development, hydrogen production and reservations presented as binding orders representing billions in revenue.^[16]

- A prototype is not a manufacturing platform.
- A technical concept is not an industrial process.
- A reservation is not necessarily a binding order.
- An order is not revenue.
- Revenue is not positive cash flow.
- Technical feasibility is not economic feasibility.

7. COVID-19: emergency as an information accelerator

The COVID-19 pandemic created near-perfect conditions for technological misinformation: extraordinary demand, rapidly changing scientific knowledge, adaptive regulation, urgent procurement and investors aggressively searching for diagnostics, therapeutics and vaccine technologies.

SCWorx illustrates the consequences. In April 2020 the company announced what it described as a committed purchase order for two million COVID-19 rapid-test kits, together with potential additional weekly orders. According to the SEC, the announcement was false or misleading. SCWorx shares increased 425% in one trading day and trading volume reached approximately 96.2 million shares, more than 900 times the preceding three-month average daily volume.^[6]

Claim → attention → valuation → verification can replace the safer sequence: evidence → verification → claim → valuation.

8. A 15-second diagnostic test that was not what investors were told

Decision Diagnostics provides an even more direct example. According to the US Department of Justice, CEO Keith Berman falsely claimed that his company had developed a finger-prick COVID-19 test capable of producing a result in approximately 15 seconds when no such test existed as represented. The DOJ stated that the scheme resulted in approximately \$28 million in investor losses; Berman was sentenced to seven years in prison. He also falsely represented the status of anticipated FDA emergency authorisation.^[7]

Investors often ask “How valuable would this be if it worked?” before establishing “What evidence proves that it works?” Those questions belong in the opposite order.

9. LK-99: speculation without proven fraud

LK-99 is analytically valuable because it represents a fundamentally different category. In July 2023, researchers released preprints claiming room-temperature and ambient-pressure superconductivity in a copper-containing material. If confirmed, the implications could have been transformative.

Scientific replication began rapidly. Subsequent materials analysis and replication work explained the superconducting-like observations without genuine room-temperature superconductivity, and Nature reported that the accumulated evidence showed that LK-99 was not a superconductor.^[8]

Nothing in this analysis requires concluding that the original researchers committed fraud. That is precisely why the case matters. A scientific hypothesis can create speculative economic consequences even when no deliberate fabrication has been established. Markets can trade the probability that an unresolved claim becomes true while scientists are still testing whether the underlying phenomenon exists.

10. When association becomes valuation: technological contagion

LK-99 also illustrates technological category contagion. When investors cannot directly purchase the discovery itself, capital may flow toward companies whose names, products or industries appear semantically related to the breakthrough. This can generate a thematic proximity premium even when the company does not own the relevant intellectual property, manufacture the technology or have a direct commercial relationship with the researchers.

The investment thesis then migrates from “this company possesses valuable technology” to “this company is associated with a technological story that investors currently value”. Those are radically different propositions.

11. Peer review is evidence, not warranty

Peer review is indispensable to scientific quality control. It is not a warranty of truth. Scientific publications remain subject to replication, methodological challenge and correction.

A Nature survey of 1,576 researchers found that more than 70% had tried and failed to reproduce another scientist’s experiments and more than half had failed to reproduce one of their own. The finding does not mean that 70% of science is unreliable; it shows that replication is a distinct evidentiary stage and that non-replication has multiple possible causes.^[9]

More than 10,000 research papers were retracted during 2023, then a record annual total, amid concerns including sham papers and compromised peer-review processes. Retraction figures likewise should not be misused as evidence that science itself is unreliable. They demonstrate the existence of scientific self-correction mechanisms and the need to distinguish a published claim from a mature evidence base.^[10]

12. AI-washing: technological vocabulary as an asset

Artificial intelligence provides the contemporary version of a recurring phenomenon. Once association with a technology becomes commercially desirable, technological terminology itself acquires marketing value.

In 2024 the SEC charged investment advisers Delphia and Global Predictions with making false or misleading statements regarding their purported use of artificial intelligence. The firms agreed to pay \$400,000 in total civil penalties.^[11]

ESMA later examined AI use in EU investment funds. Its 2025 analysis stated that occurrences of “AI-washing” in the EU investment-management industry appeared contained, while defining the practice as exaggerating the amount of AI technology used in products and recognising the associated investor-protection concern. ESMA also

observed that among funds mentioning AI or ML in disclosure documents, one third used one of the terms directly in the fund name, while only about half primarily determined their investment strategy through AI.^[12]

When a technological label commands a valuation premium, businesses acquire an incentive to use the label before they have earned the technological substance behind it.

13. The Evidence-to-Valuation Gap

The cases described above support a proposed analytical concept: the Evidence-to-Valuation Gap (EVG). Let E represent the maturity and quality of the evidence supporting a technology, and V the economic value attributed to the technological proposition. In disciplined development, valuation should ultimately be supported by evidence. But speculative markets can produce periods in which $\Delta V \gg \Delta E$: economic value increases dramatically while the evidence changes little.

The EVG should not be interpreted as a validated econometric metric. It is proposed here as a technology due-diligence heuristic. A large EVG does not automatically imply fraud or irrationality. It indicates elevated dependence on future evidence. Early-stage biotechnology and deep-tech investments may legitimately have large EVGs because investors consciously price probability-weighted future outcomes.

The correct question is not whether an Evidence-to-Valuation Gap exists, but whether its magnitude is understood, disclosed and rationally priced.

FIGURE 2. EVIDENCE-TO-VALUATION GAP (EVG)

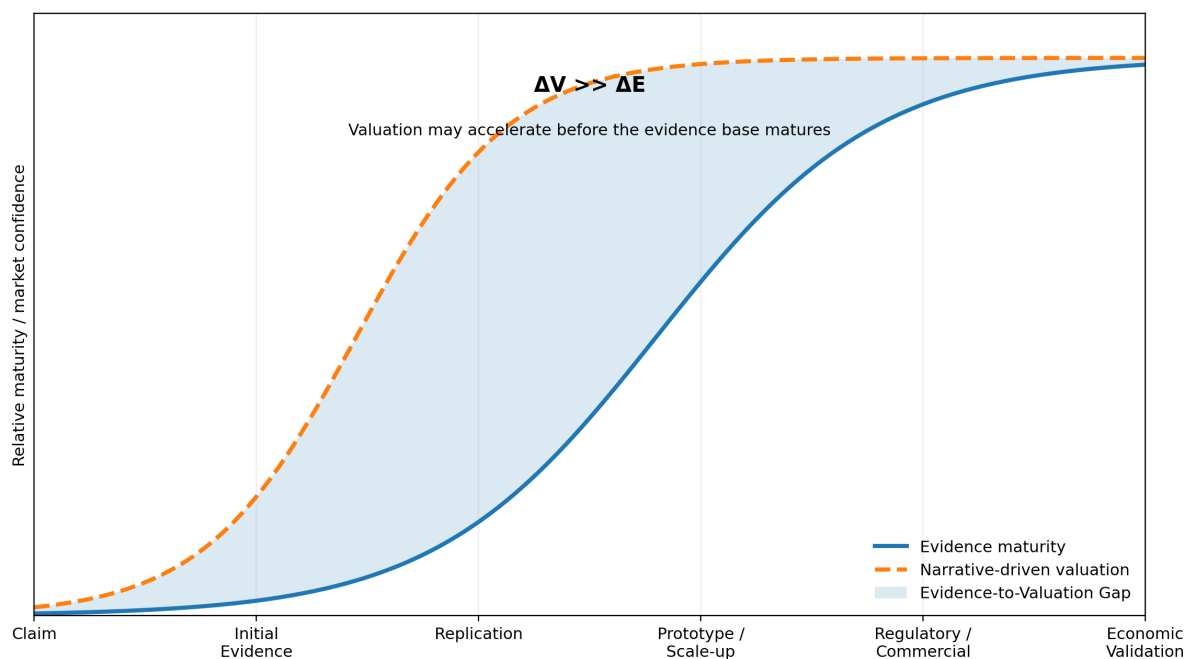
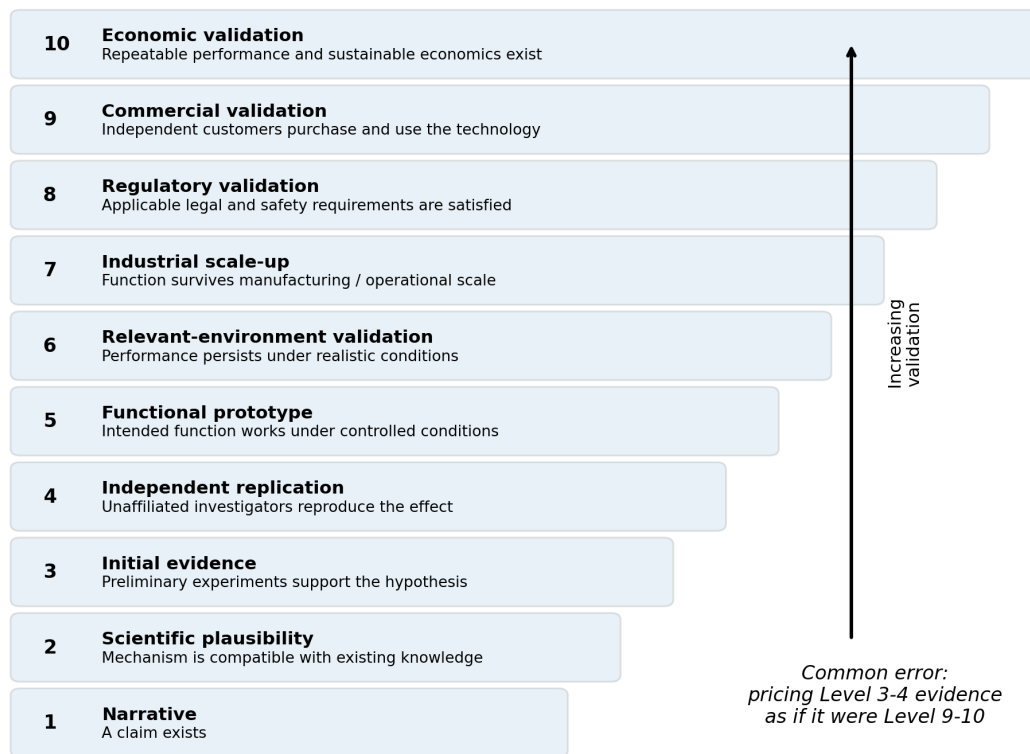


Figure 2. Evidence-to-Valuation Gap (EVG). Conceptual heuristic proposed in this article; not a validated econometric measure.

14. The INTABIOTECH Evidence Ladder for Technology Due Diligence

A practical assessment of technological maturity can distinguish ten evidentiary levels. The framework below is proposed as an analytical tool rather than an existing regulatory or scientific standard.

FIGURE 3. INTABIOTECH EVIDENCE LADDER FOR TECHNOLOGY DUE DILIGENCE*Figure 3. INTABIOTECH Evidence Ladder for Technology Due Diligence. Proposed analytical framework.*

One of the most common analytical errors in technology valuation is effectively assigning Level 9 or Level 10 economics to propositions supported only by Level 3 or Level 4 evidence.

Level	Evidence status	What has actually been demonstrated
1	Narrative	A claim exists
2	Scientific plausibility	Mechanism is compatible with existing knowledge
3	Initial evidence	Preliminary experiments support the hypothesis
4	Independent replication	Unaffiliated investigators reproduce the effect
5	Functional prototype	Intended function works under controlled conditions
6	Relevant-environment validation	Performance persists under realistic conditions
7	Industrial scale-up	Function survives manufacturing / operational scale
8	Regulatory validation	Applicable legal and safety requirements are satisfied
9	Commercial validation	Independent customers purchase and use the technology
10	Economic validation	Repeatable performance and sustainable economics exist

15. The missing dimension: scalability

Scientific validity and industrial validity are different questions. A technology may function scientifically while failing industrially because scale changes systems: heat and mass transfer, residence times, impurity profiles, energy consumption, supply-chain constraints, equipment requirements, yield losses and regulatory specifications all become relevant.

Scientifically real ≠ industrially viable. Industrially viable ≠ commercially attractive.

Deep-tech due diligence therefore requires at least four separate conclusions: Does it work? Can it be manufactured? Can it be legally commercialised? Can it make money? A convincing answer to the first question does not answer the remaining three.

16. Red flags in scientific and technological narratives

None of the following indicators proves deception. Several occurring together justify a higher evidentiary burden:

1. Extraordinary claims accompanied primarily by proprietary evidence.
2. Repeated references to patents as proof of efficacy.
3. Absence of independent replication.
4. Reliance on founder authority rather than accessible data.
5. Selective disclosure of successful experiments without failure rates.
6. Presentation of prototypes as manufacturing capability.
7. Use of non-binding agreements as evidence of commercial demand.
8. Technological vocabulary that changes rapidly to follow market trends.
9. Unusually large commercial projections based on small experimental datasets.
10. Confidentiality invoked whenever contradictory evidence or critical testing is requested.

17. Legal consequences: when hype becomes market abuse

In the European Union, Regulation (EU) No 596/2014 on market abuse expressly includes, within the definition of market manipulation and subject to its legal conditions, dissemination through the media, including the internet, of information that gives or is likely to give false or misleading signals concerning financial instruments, including dissemination of rumours where the person knew or ought to have known that the information was false or misleading. Article 15 prohibits market manipulation and attempted market manipulation.^[14]

The Regulation's recitals also recognise the speed problem directly: false or misleading information can affect prices rapidly, while harm may persist until the information is identified and corrected. For listed companies, statements about clinical results, technical milestones, regulatory status, manufacturing capability, orders or technological readiness can therefore migrate from marketing language into securities-law risk.^[14]

18. Correction has a speed problem

Technological misinformation enjoys a structural advantage: the claim is usually simple; the correction is usually complex. "Room-temperature superconductor discovered" fits comfortably into a headline. Explaining crystallographic impurities, resistivity, magnetic susceptibility and replication methodology does not.

A 2026 Nature Communications analysis examined 237,180 community-fact-checked cascades on X that had been reposted more than 431 million times. Displaying community notes reduced subsequent reposting of misleading posts by an average of 61.2% in the study design. But the median time before a note became visible was 18.1 hours, while the average half-life of reposting was only 6.25 hours; the estimated system-wide reduction in total engagement was therefore much smaller, around 14.9%.^[15]

A correction can be effective and still arrive economically too late.

19. Scientific due diligence as competitive intelligence

The conventional response to technological hype is scepticism. That response is insufficient. Excessive scepticism can destroy value just as effectively as technological credulity. Many transformative technologies initially appear improbable. The objective is not to reject extraordinary claims; it is to assign them the correct evidentiary status.

Scientific due diligence can therefore become a strategic capability. A company that correctly identifies a technically credible innovation before consensus forms can obtain first-mover advantage. A company that recognises that an apparently revolutionary proposition lacks mechanistic plausibility, replication or scalability can avoid catastrophic capital allocation.

The competitive asset is not scepticism. It is epistemic discrimination.

20. The corporate governance implication

Technology companies should consider scientific claims part of their internal disclosure-control architecture. Before a major technological statement reaches investors, customers or the media, the organisation should know what has actually been demonstrated, under which conditions, by whom, with what reproducibility, at what scale, with which limitations and under which regulatory assumptions.

This supports the concept of a Scientific Claims Governance System: an internal process ensuring that public technical statements can be traced to evidence, assumptions and validation status. The concept is proposed here as a governance framework, not as an existing legal standard.

Finance departments would not allow revenue to be invented. Technology departments should not allow technical maturity to be invented either.

21. Ten questions before buying a technological narrative

11. What exactly is being claimed?
12. Which parts are directly observed and which are inferred?
13. Where are the primary data?
14. Has the central result been independently reproduced?
15. Does the claimed mechanism fit established scientific knowledge, and if not, what extraordinary evidence supports the departure?
16. Has performance been demonstrated under commercially relevant conditions?
17. Has scale-up occurred, and with what yield, stability, energy requirement and unit economics?
18. What regulatory assumptions are embedded in the business model?
19. Which parts of the valuation depend on technological milestones that have not yet been achieved?
20. What future observation would prove the investment thesis wrong?

A proposition that cannot be falsified is not being evaluated scientifically. It is being believed.

22. Buy the evidence, not the adjective

Technological narratives are rich in adjectives: revolutionary, disruptive, breakthrough, proprietary, transformational, patented, AI-powered, clinically validated, next-generation, quantum, precision, smart, advanced. None is an evidentiary category.

The appropriate response is therefore operational rather than rhetorical: Compared with what? Measured how? Validated by whom? Reproduced where? At what scale? Under which regulatory conditions? With what economic result?

23. From “buy the rumor” to “price the uncertainty”

There is nothing irrational about investing before technological certainty exists. Without risk capital, many important technologies would never leave the laboratory. The fundamental error is not investing under uncertainty. It is mispricing uncertainty because narrative has been mistaken for evidence.

- Interrogate the rumour.
- Determine the maturity of the evidence.
- Identify what remains hypothetical.
- Separate scientific risk from engineering risk.
- Separate engineering risk from regulatory risk.
- Separate regulatory risk from commercial risk.
- Price each uncertainty accordingly.

Conclusion

“Buy the rumor, sell the news” originated as an observation about financial-market psychology. In the scientific economy, it has become a warning about the relationship between knowledge and value.

The rumour may concern a molecule, a diagnostic platform, a superconducting material, a hydrogen system, an artificial-intelligence platform, a quantum processor, a longevity intervention or a synthetic-biology process. The specific technology will change. The underlying informational architecture will not.

Markets can assign value in milliseconds. Scientific replication takes time. Engineering takes longer. Industrial validation takes longer still. Regulation, adoption and sustainable economics may require years.

Sometimes the resulting Evidence-to-Valuation Gap represents rational investment in the future. Sometimes it represents misplaced enthusiasm. Sometimes misinformation. In extreme cases, fraud. Knowing which one is present requires something more useful than excitement or cynicism: disciplined evidence assessment.

Do not buy the rumour. Do not automatically reject it either. Measure the evidence, price the uncertainty — and never confuse a technological story with technological reality.

Methodological note

The Evidence-to-Valuation Gap, the INTABIOTECH Evidence Ladder and the Scientific Claims Governance System are analytical frameworks proposed in this article. They are not presented as established academic metrics, regulatory standards or validated scoring systems. Their purpose is to structure technology due diligence and clarify the difference between scientific evidence, technological readiness and economic valuation.

Case studies are used to illustrate information mechanisms, not to imply equivalence among them. Criminal or regulatory findings are described as such; scientific controversies are separately characterised according to the available scientific evidence.

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