

# Working paper - Degrees and AI - 2026

*Do university degrees still matter in the age of artificial intelligence?*

*From static credentials to continuous certification of competences, judgment and accountability*

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# Synthetic thesis

## Short answer

The university degree still matters, but not always and not in its present form. It remains strong where it certifies public accountability, method, disciplinary depth, access to regulated professions, and social trust. For many digital, creative, entrepreneurial, and operational professions, by contrast, AI reduces the university's monopoly over learning and makes portfolio-based, micro-credential-based, apprenticeship-based, and competence-assessment-based pathways more credible. The question is no longer "degree or no degree," but rather: "which combination of degree, AI, proof of competence, and accountability is required for that particular professional risk?"

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## Abstract

This working paper examines whether the university degree — understood in its traditional form as a front-loaded, multi-year, standardised, and predominantly examination-based pathway — retains its necessity in an economy where generative artificial intelligence makes personalised tutoring, content production, programming assistance, data analysis, and the partial automation of cognitive tasks broadly accessible. The thesis is that AI does not eliminate the need for higher education, but rather unbundles the functions historically concentrated within the degree: knowledge transmission, labour-market signalling, socialisation, networking, professional licensing, and the formation of judgment. Available evidence indicates that the economic premium of tertiary education remains substantial: the OECD estimates an average earnings advantage of 54% for workers with tertiary education compared with those holding only upper-secondary qualifications, while the 2024 BLS figures show higher median earnings and lower unemployment rates for university degree holders. At the same time, these systems show structural fragilities: only 43% of new bachelor's entrants in OECD countries complete their studies within the expected duration; adult skills are stagnant or declining in many countries; and the labour market is shifting towards updateable competences, AI literacy, and verifiable portfolios. The paper proposes the LAUREA 2.0 model: lifelong Learning, AI tutor, University as certifier, Real-world portfolio, Ethical epistemology, continuous Accreditation. The conclusion is that the degree should not disappear, but should lose its monopoly as the sole passport into qualified work.

*Note on naming: "LAUREA" is the Italian word for "university degree." The Italian acronym is preserved here for branding consistency with the original framework. In English the same six components could be summarised as DEGREE 2.0; the underlying meaning is identical.*

## Abstract (English original)

This working paper investigates whether the traditional university degree remains necessary in an economy where generative artificial intelligence provides personalised tutoring, content generation, programming assistance, data analysis, and partial automation of cognitive work. The central claim is that AI does not eliminate the need for higher education, but unbundles the functions historically concentrated in the degree: knowledge transmission, labour-market signalling, socialisation, network formation, professional licensing, and the formation of judgment. Evidence suggests that the economic value of tertiary education remains substantial; however, traditional degree systems face pressure from slow updating, weak completion rates, uneven skills outcomes, and the rise of skills-first hiring. The paper proposes the LAUREA 2.0 framework: lifelong modular Learning, AI tutoring, Universities as certifiers, Real-world portfolios, Ethics and epistemic responsibility, and

continuous Accreditation. The conclusion is that the degree should not disappear, but should lose its monopoly as the only trusted pathway into qualified work.

**Keywords:** generative artificial intelligence; university degree; higher education; competences; micro-credentials; skills-first hiring; future of work; human capital; signalling.

**JEL classification:** I23, I24, J24, O33, M53.

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## 1. Introduction and research question

For over a century, the university degree has functioned as one of the main mechanisms of access to qualified work. It was not merely a learning pathway: it was a filter, a rite of passage, a signal of ability, a social network, an implicit or explicit licence, and a promise of reliability.

The arrival of generative artificial intelligence shifts the terrain because it makes available, at very low marginal cost, personalised tutoring, on-demand explanations, simulations, text production, analysis, code, translation, revision, exercises, and feedback. In other words, a substantial portion of the "standard university lecture" has become replicable by digital systems that work twenty-four hours a day, without strikes, coffee breaks, or the need for parking.

The research question is not whether AI makes learning unnecessary. On the contrary: in a world that changes more rapidly, learning becomes more important. The question is more precise: is a university degree still needed in its current form — that is, as a long, front-loaded, often generalist pathway, costly in terms of time, and sometimes distant from the labour market? Or is a new certification system required: more modular, continuous, and centred on the actual demonstration of competence?

The paper argues an intermediate but firm thesis: the degree is not dead, but the degree as a monopoly over qualified knowledge is over. Its future necessity will depend on the type of work, the social risk of error, the degree of professional regulation, the difficulty of assessing output and competences through alternative means, and the formative value of the university environment. In regulated and high-risk fields — medicine, law, safety-critical engineering, advanced research — the degree will remain central. In digital, creative, entrepreneurial, and operational fields, the degree will have to compete with portfolios, verified experience, micro-credentials, apprenticeships, and AI-enhanced practical assessments.

## Research question

*Is a university degree, as we know it today, still required, or does AI make a new model of higher education necessary — one based on verifiable competences, portfolios, and continuous accreditation?*

## 2. Method and research design

This work is constructed as an integrative review and a scenario paper. It does not yet present an original regression on individual microdata; rather, it integrates economic literature, institutional reports, labour-market evidence, AI adoption data, and theoretical reflection on the functions of the university degree. The methodology is appropriate for a working paper or an academic white paper; a peer-reviewed version would require a replicable dataset, quantitative analysis, and external review.

The design is multidisciplinary. The economics of education interprets the degree as an investment in human capital and as a signal. Sociology considers status, networks, and social mobility. Organisational theory examines selection and corporate training processes. AI ethics addresses responsibility, bias, accountability, and capacity for judgment. Pedagogy studies how learning changes when feedback and tutoring become personalised. An internal red team sought to demolish the thesis by testing two risks: underestimating the persistent value of the degree, and overestimating the substitutability of AI.

Perspective	Guiding question	Contribution to the paper
Labour economics	Does the degree still generate a wage premium and employment protection?	Assesses human capital, signalling, employability, and ROI.
Pedagogy	Can AI replace or augment structured learning?	Distinguishes content transmission, feedback, practice, and judgment.
Sociology	Is the degree also network, status, and mobility?	Highlights social functions not reducible to course content.
Firms and HR	Do companies really hire for skills?	Analyses skills-first hiring, portfolios, and practical assessments.
Ethics and policy	Who guarantees accountability in high-risk work?	Identifies the limits of fully unaccredited pathways.
Red team	Which conclusions are too strong?	Avoids the false slogan "the degree is dead."

## 3. What the degree did before AI: five functions

Public debate often treats the degree as if it were a single thing. In reality, it is a bundle of functions. AI does not attack all of these functions in the same way. It attacks the standardised transmission of content and repetitive practice with considerable force; it attacks professional socialisation, institutional trust, public licensing, and the maturation of judgment far less.

The first function is the **transmission of knowledge**. Here AI is disruptive: a generative model can explain concepts, produce examples, personalise exercises, simulate dialogues, correct drafts, and generate quizzes. The second function is the **signal to the labour market**: the title communicates ability, perseverance, selection, and conformity to standards. The third function is **regulatory certification**, decisive for professions where errors may harm patients, clients, infrastructure, or the administration of justice. The fourth function is the **network**: classmates, faculty, alumni, contacts, and social capital. The fifth is the **formation of the person**: method, discipline, exposure to diverse ideas, ethics, the capacity to argue and to accept external evaluation.

Historical function of the degree	What it provides	Impact of AI	Consequence
Knowledge	Lectures, textbooks, exercises, explanations	High substitutability / augmentation	Value shifts from content to the capacity to use and verify knowledge.
Signal	Filter of perseverance, ability, status	Partial erosion	Portfolios and practical assessments may become competing signals.
Licence and trust	Authorisation, accountability, public standards	Low substitutability	The degree remains strong in regulated and high-risk work.
Social network	Alumni, peers, faculty, relational capital	Low direct substitutability	Universities retain advantage if they build genuine communities.
Formation of judgment	Method, criticism, ethics, professional identity	AI as support, not substitute	Becomes the most strategic component of higher education.

## 4. Empirical evidence: the degree still has value, but the model is creaking

### 4.1 Economic value has not disappeared

The first error would be to claim that the degree is now worthless. The aggregate evidence says the opposite. The OECD, in *Education at a Glance 2025*, finds that workers with tertiary education employed full-time and full-year earn on average 54% more than those with only upper-secondary education. The same source indicates that the advantage grows with the level of qualification: roughly 39% for the bachelor's and 83% for master's or doctoral degrees relative to upper-secondary education, with substantial cross-country variation.

In the United States as well, the 2024 BLS figures show a clear gradient: workers with a bachelor's degree record a median weekly income of USD 1,543 and an unemployment rate of 2.5%, compared with USD 930 and 4.2% for those with only a high-school diploma. Statistically, the credential continues to protect. This does not mean that every degree is worth its cost or that every student should enrol: it means that, on average, the

degree remains a powerful economic signal.

*Source: author's elaboration on U.S. Bureau of Labor Statistics data, "Education pays: Earnings and unemployment rates by educational attainment, 2024."*

## 4.2 The current model shows inefficiencies

The second error would be to infer from the average premium that the model is healthy. The OECD reports that only 43% of new bachelor's entrants complete their studies within the expected duration; the share rises to 59% after one additional year and to 70% after three additional years. This indicates that the traditional pathway is often long, uncertain, and costly in terms of time. Moreover, the OECD observes that, despite the rise in qualifications, adult literacy and numeracy skills are stagnant or declining in many countries. Without ceremony: printing more diplomas does not automatically produce more competence.

The central issue is mismatch. The degree is a relatively static certificate in a labour market that is becoming dynamic. A person may graduate in 2026 with skills that, by 2029, are already obsolete. The value of the credential as a memory of the past remains, but the market also needs proof of the present: what you can do now, with which tools, at what quality, and with what accountability.

## 4.3 Skills-first hiring: a real promise, an incomplete adoption

The transition to a skills-first labour market is real but non-linear. The Burning Glass Institute and Harvard Business School show that many firms have announced the removal of degree requirements, yet actual changes in hiring practices are often far slower: many companies change the language of job postings without genuinely altering their selection processes. The LinkedIn Economic Graph (2023), by contrast, finds that a skills-first approach can expand the pool of candidates without a bachelor's degree, especially among Gen Z and underrepresented groups. The direction is clear; in practice, as is often the case in firms, change arrives with the calm of a jammed printer.

This point is crucial: the degree is not being replaced by "nothing." Where possible, it is being replaced by alternative mechanisms of trust: technical tests, portfolios, references, apprenticeships, verified projects, short certifications, professional reputation, open-source contributions, simulations, assessment centres, and AI-assisted or AI-evaluated practical tasks.

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# 5. How AI is reshaping learning, work, and certification

## 5.1 AI raises cognitive productivity, especially in standardisable tasks

The empirical literature on the early applications of generative AI shows significant productivity gains, though not uniformly distributed. Noy and Zhang find that ChatGPT reduces the average completion time of professional writing tasks by 40% and increases quality by 18%. Brynjolfsson, Li, and Raymond estimate that a conversational assistant in customer support raises average productivity by 15%, with larger improvements for junior or less-qualified workers. Peng and co-authors, in an experiment using GitHub Copilot, observe a 55.8% faster completion rate on a specific programming task.

These results do not prove that the degree is useless. They demonstrate something more interesting: AI compresses the advantage of those who possess only standard executive skills, and raises the value of those who can formulate problems, control outputs, integrate sources, take on accountability, and recognise when the model is delivering a nonsense answer with the tone of a tenured professor.

## 5.2 AI accelerates the adoption of updateable competences

According to McKinsey, in 2025, 88% of surveyed organisations report regular use of AI in at least one business function; 62% are at least experimenting with AI agents. Microsoft and LinkedIn report in 2024 that 75% of knowledge workers use AI at work, and that 66% of leaders state they would not hire candidates lacking AI competences. The World Economic Forum projects that 39% of workers' core skills will change by 2030. The Stanford AI Index 2026 notes that generative AI has reached 53% adoption in the general population within three years, faster than personal computers and the internet.

The traditional university, with slow update cycles, struggles to keep pace. The point is not to add an elective course on "ChatGPT for beginners" and declare the mission accomplished. What is required is to redesign assessment, curricula, internships, laboratories, ethics, research, and the relationship with industry.

*Source: author's elaboration based on McKinsey 2025, Microsoft/LinkedIn 2024, Stanford AI Index 2026, and WEF 2025.*

## 5.3 The AI learning paradox: more access, more need for judgment

AI democratises access to explanations and tools, but does not automatically democratise judgment. Indeed, it can amplify errors if the user lacks robust mental models. The technological frontier is "jagged": in some tasks AI helps significantly, in others it may worsen the outcome when used without competence. For this reason, the most important competence is not prompt engineering understood as the trick of the month, but rather practical epistemology: knowing what to ask, how to validate, when to doubt, which sources to use, and what responsibility to assume.

This is good news for universities, if they grasp it in time. Their role should not be to compete with AI on the summary of a textbook. They must form people capable of using intelligent systems without becoming dependent, manipulable, or superficially competent.

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## 6. Where the degree remains necessary and where it loses its monopoly

The correct answer varies by domain. When the social cost of error is high and the output is not readily evaluable by the average client, the degree retains a public function. Medicine, pharmacy, clinical psychology, structural engineering, regulated law, teaching, advanced scientific research, and the health professions require not only technical competence, but institutional accountability, standards, supervised internships, and licensing. In these fields, AI can improve training and practice, but it should not eliminate the certified pathway.

Conversely, when output is directly observable, measurable, and correctable, the credential loses its monopoly. Software works or it does not; a campaign converts or it does not; a design persuades or it does not; a product finds a market or remains on the digital shelf alongside other great ideas that were never used. Here, portfolios, real projects, reputation, and the capacity to learn can outperform the credential, especially where AI enables individuals without a traditional university pathway to acquire and demonstrate competences rapidly.

Professional area	Need for the traditional degree	Why	Plausible alternative or complement
Medicine and health	Very high	Patient risk, licensing, public accountability.	AI tutoring, clinical simulation, continuous assessment.
Regulated law	High	Legal accountability, access to professional bodies, public standards.	Legal tech, supervised practice, oral examinations, real cases.
Safety-critical engineering	High	Errors can cause physical and infrastructural damage.	Laboratories, technical certifications, digital twins, audits.
Software and data	Medium and declining	Output is verifiable, portfolios are strong, rapid obsolescence.	Portfolios, open source, serious bootcamps, micro-credentials.
Marketing, design, media	Low to medium	Output is measurable and portfolios dominate.	Real projects, metrics, reputation, AI fluency.
Entrepreneurship	Low as a requirement	The market evaluates results more than the credential.	Mentorship, incubators, experiments, finance and management.
Academic research	High	Method, peer review, production of original knowledge.	AI research assistants, open science, more industry-oriented doctorates.

Source: conceptual elaboration by the author based on professional risk and the evaluability of output.

## 7. Proposed model: LAUREA 2.0

The paper proposes neither to defend the traditional degree out of nostalgia, nor to demolish it for the sake of fashion. The solution is to transform it. The LAUREA 2.0 model reinterprets the university not as a sole source of content, but as an infrastructure for certification, method, community, accountability, and lifelong learning.

The acronym LAUREA identifies six components: lifelong and modular **L**earning; AI tutor and personalised feedback; **U**niversity as certifier of competences and not merely a distributor of lectures; **R**real-world portfolio and apprenticeship; **E**thics, epistemology, and accountability; continuous **A**ccreditation. The degree becomes less an object obtained once, and more a system of validation updateable across professional life.

*Note: "LAUREA" is preserved as a brand mark and as the Italian word for "degree." In English the same six components could be summarised as DEGREE 2.0 — Italian acronym retained for branding consistency.*

LAUREA 2.0 component	Description	Operational example
Lifelong Learning	Modular pathway updated across the career.	Renewable credits every 2-3 years on tools, method, and domain.

LAUREA 2.0 component	Description	Operational example
AI tutor	Personalised tutor for exercises, feedback, and simulations.	Laboratories with AI that assesses drafts, code, cases, and presentations.
University as certifier	The university validates competences acquired elsewhere as well.	Practical examinations, oral defences, portfolio audits, challenge exams.
Real-world portfolio	Real projects as proof of learning.	Thesis replaced or complemented by a product, research output, or measurable impact.
Ethics and epistemology	Capacity to verify, doubt, and attribute responsibility.	Mandatory courses on bias, sources, security, compliance, and decision-making.
Continuous Accreditation	The degree does not expire, but certain competences do.	Verified badges, micro-credentials, and professional refresh cycles.

Source: original model proposed in this working paper.

## 8. Scenarios 2026-2035

The future trajectory will depend on regulation, the labour market, universities' capacity to update themselves, and the reliability of alternative assessment systems. Four scenarios are plausible.

Scenario	Description	Qualitative probability	Implication
1. Adaptive preservation	The degree remains dominant but integrates AI into courses.	Medium	Teaching changes, structure changes little. Risk of cosmetic reform.
2. Modular hybrid	Degree + micro-credentials + portfolio + AI tutor.	High	Most likely scenario: the credential remains, but loses monopoly.
3. Skills-first disruption	Many sectors hire on the basis of practical tests and portfolios.	Medium in digital/creative; low in regulated sectors	Mobility rises for competent non-graduates, but anti-chaos standards are required.
4. Regulatory backlash	Fear of AI, fraud, and false competences strengthens traditional credentials.	Medium	The degree becomes a refuge of trust, but risks blocking innovation.

### Central forecast

By 2035, the degree will remain strong as a credential of trust in regulated and high-accountability sectors, but will become only one of several possible pathways for many knowledge professions. The market will reward verifiable combinations of degree, AI literacy, real-world experience, and portfolio.

## **9. Practical implications**

### **9.1 For universities**

Universities must stop treating AI as a disciplinary problem and begin treating it as a new cognitive infrastructure. Banning AI generically in written examinations is an understandable but insufficient response. The solution is to design assessments where AI is permitted but where the human being must demonstrate understanding, method, choice, accountability, and the capacity for oral defence.

A serious reform should include: compulsory AI literacy in the first year; real projects with external clients; verifiable portfolios; oral and practical examinations; internal micro-credentials; longer and supervised internships; faculty updating; the use of AI for personalised feedback; and assessment of the capacity to control errors, biases, and sources.

### **9.2 For firms**

Firms should not discard the degree as a criterion, but should stop using it as a lazy shortcut. A mature selection process combines credential, practical assessment, portfolio, references, learning ability, and AI literacy. Removing the degree requirement from job postings without changing assessment and onboarding is HR marketing, not innovation.

Companies that genuinely wish to hire for skills must build realistic tests, apprenticeship programmes, protected junior pathways, and performance metrics. AI may reduce the need for repetitive junior tasks; precisely for this reason, firms must rethink how they train young workers. If they eliminate all junior roles, ten years from now they will find themselves with many imaginary senior staff and few real professionals.

### **9.3 For students and families**

The choice should not be ideological. The practical question is: does the sector require a licence? Does the qualification carry a strong economic premium? Does the university offer networks, internships, and real projects? Does the course update AI competences? Is there a faster and more credible alternative pathway? Do I have sufficient discipline to learn outside a formal structure? This last question is irritating but decisive: self-directed learning is wonderful until the day Netflix, notifications, and "I'll do it tomorrow" join the scientific committee.

For many students, the degree remains a sensible investment. For others, especially in digital fields, a hybrid pathway may be superior: serious short courses, portfolios, mentorship, public projects, early work, and continuous updating. The bad choice is not whether or not to enrol in university; it is to choose a pathway without measuring its return, quality, and coherence with one's field.

### **9.4 For policymakers**

Public policies should promote an ecosystem of trustworthy credentials. The European Union has already adopted an approach to micro-credentials for lifelong learning and employability, with the aim of making them developable and recognisable across institutions, firms, sectors, and countries. This is a step in the right direction, but the challenge is to ensure that micro-credentials do not become digital confetti without value.

Standards are needed: educational quality, identity verification, authentic assessment, traceability, portability, recognition by firms, and audits against fraud. Furthermore, access to educational AI must be equitable: if only some students have advanced AI tutors, the technology will widen inequalities rather than reduce them.

## 10. Conclusion

Does the degree still matter? Yes — but not as a universal dogma. It matters when it certifies deep competences, public accountability, regulated access, method, and trust. It matters much less when it is used as a lazy proxy for jobs in which competences are observable, testable, and updateable more rapidly outside the traditional university pathway.

AI does not render higher education useless. It renders mediocre higher education useless. A standard lecture, a memorisation-based examination, and a curriculum updated every five years compete poorly with an AI tutor available at all hours. But a university that trains judgment, method, ethics, research, collaboration, real experience, and the capacity to use AI critically becomes more, not less, necessary.

The most defensible conclusion is therefore the following: the degree should not be abolished; it should be unbundled, verified, made modular, and connected to real work. The future is not "no degree." The future is: "no credential without demonstrable competence, no competence without updating, no use of AI without human judgment." If the university accepts this challenge, it remains central. If it refuses, it will be bypassed. Slowly at first, then very quickly — as always happens when an institution confuses its own past with its own right to the future.

### Final thesis

*The degree of the future will not be a static certificate of what a person studied in the past, but a continuous infrastructure of trust: demonstrated competences, verified judgment, public accountability, and the capacity to collaborate with intelligent systems.*

## 11. Limitations and empirical protocol for a peer-reviewed version

This paper is a theoretical and analytical working paper. The main limitations are threefold. First, aggregate evidence on the degree premium does not establish individual causality: those who graduate differ from those who do not on many unobserved variables. Second, AI's impact on the labour market is still evolving and depends on adoption, regulation, organisational models, and tool quality. Third, skills-first hiring is more announced than realised in many contexts.

A peer-reviewed version should test empirical hypotheses using longitudinal microdata. The key variables would include: educational qualification, field of study, income, unemployment, underemployment, AI use, portfolio, short certifications, sector, age, experience, institutional quality, educational debt, social mobility, geographic area, and degree requirements in job postings. Plausible methods include panel regressions, difference-in-differences on changes in degree requirements, event studies on the introduction of AI tools in firms, and textual analysis of job postings.

Testable hypothesis	Indicator	Proposed method
H1: the average degree premium persists but becomes more heterogeneous.	Earnings by field, institution, age, and AI exposure.	Regression with controls and interactions.

Testable hypothesis	Indicator	Proposed method
H2: AI reduces the value of the degree in occupations with observable output.	Degree requirements and hiring in software, marketing, design.	Difference-in-differences on postings and hires.
H3: AI competences raise employability independently of credential.	AI skills in profile, callback rates, starting salary.	Audit study or LinkedIn / job-postings data.
H4: verified portfolios replace part of the university signal.	Presence of portfolio, GitHub, real cases, practical assessments.	Hiring probability model.
H5: in regulated sectors the degree remains necessary.	Legal requirements and safety/quality outcomes.	Comparative institutional analysis.

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## Appendix A — Decision matrix for choosing whether to enrol in a degree programme

The following matrix does not replace professional career counselling, but helps avoid two errors: enrolling out of inertia, or refusing university for the sake of fashion. Each criterion may be scored from 1 to 5. A high score on the first four criteria points towards a degree; a high score on the last four points towards hybrid or alternative pathways.

Criterion	Question	If high, it indicates
Regulation	Is a legally recognised qualification required to practise?	Degree nearly mandatory.
Social risk of error	Could an error damage people, justice, health, or infrastructure?	Certified and supervised training is required.
Economic premium of the field	Does the field have a documented ROI for graduates?	Degree potentially rational.
Quality of the network	Does the university offer strong networks, internships, faculty, and alumni?	Value beyond lectures.
Evaluability of output	Can the work be assessed through portfolio/product?	Alternative pathway more credible.
Speed of obsolescence	Do the competences change every 6-18 months?	Micro-credentials and continuous practice essential.
Self-discipline	Can the person learn without external structure?	Alternative pathway feasible only if high.
Access to mentorship	Are mentors, communities, and real projects available?	Can substitute part of the university network.

## Appendix B — Conceptual formula for the value of the degree

The net value of the degree in the AI era may be represented conceptually as:

$$V_d = H + S + R + N + G - C - T - M$$

where:

- **H** = human capital acquired
- **S** = labour-market signal
- **R** = accountability / licence
- **N** = network

- **G** = formation of judgment
- **C** = economic cost
- **T** = time / opportunity cost
- **M** = mismatch / obsolescence

AI reduces the university's monopoly over H, but increases the value of G and R: in a world of automatically generated outputs, it becomes more important to know who is accountable, who validates, and who genuinely understands.

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## **Methodological disclosure**

This working paper was drafted with the assistance of generative AI under the conceptual and editorial direction of Giuseppe Nesca (founder, Fattore Crescita magazine). All citations were manually verified against primary sources on 27 May 2026; four bibliographic corrections were applied in version 1.1. The argument, structure, model (LAUREA 2.0) and editorial decisions are the author's; AI tooling was used for drafting, English translation, and formatting. The paper is released as a working draft inviting peer review. A peer-reviewed version is planned following the empirical protocol described in Section 11.

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