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MODERN INTANGIBLES AND EUROPE'S COMPETITIVENESS CHALLENGE

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EDITORIAL

The Soil Monitoring Law brings contaminated sites into valuation's orbit

Directive (EU) 2025/2360 of 12 November 2025 on soil monitoring and resilience (Soil Monitoring Law)

Michael MacBrien

In many parts of the Union, valuers must often insert contaminated sites in the disclaimer due to the authorities' poor and incomplete mapping. This first EU law on soil monitoring will phase that out.

The Law had an interesting genesis

Even though soil health is a major basis of human and animal health, food and water quality, biodiversity, carbon storage and resilience to drought, floods and heat islands, it never got a foothold in any of the EU environmental legislative cycles. Member States thought it would be expensive and bureaucratic and would interfere with national power over spatial planning. The European Commission didn't think it could fly. ***It was not even part of the 2019 European Green Deal package.***

It is the child of a single member of the European Parliament, Martin Hojsík, who got a green-fatigued Parliament to vote a Resolution that forced the Commission's hand and led it to table a legislative proposal. Then, as Parliament's Rapporteur, he engineered and steered it through Parliament and negotiations with Council.

His winning strategy was to restrict the scope of the directive to finding out what's out there *without imposing any remediation obligations*, simply an aspirational "view to achieving healthy soils by 2050" (Art.1(1)). It was conceived as the necessary first step – an obligatory European monitoring and assessment framework now, more later.

But for valuers, monitoring and assessment of contaminated sites are key. They make all the difference between inclusion in the valuation report and exile to the disclaimer.

"... for valuers, monitoring and assessment of contaminated sites are key. They make all the difference between inclusion in the valuation report and exile to the disclaimer."

Valuation-relevant content

Member States must systematically identify potentially contaminated sites on their territory *(Art. 14(1))*. Importantly for valuation, this includes identifying past operation of potentially contaminating activity.

They must **investigate the potentially contaminated sites identified** and lay down rules on the timeframe, content, form and prioritisation of investigations *(Art. 15)*. The only binding obligation on Member States concerns laying down the rules, not their content but interestingly, the recitals mention **specific events that trigger investigations** that "could include the request for, or review of, an environmental or building permit or an authorisation required pursuant to Union or national law, soil excavation activities, land use changes, or ***land or real estate transactions***." *(Recital 64)*

Also crucial for valuers, Member States must set up and maintain a register of potentially and definitely contaminated sites, made available to the public, free of charge, in the form of an online georeferenced spatial database *(Art. 17)*, the part of the obligatory content that seems especially valuer-useful being:

- The coordinates, address or cadastral parcel(s) of the site
- Contaminating or potentially contaminating activities that have taken or are taking place on the site
- Conclusions regarding the presence or absence, type and risk of the contamination

(Annex VI)

The Annex also includes valuer-useful information on environmental permits, current and planned land use, results of soil investigation and remediation reports and timeline for subsequent actions and management steps, but that part is not binding on Member States.

"Also crucial for valuers, Member States must set up and maintain a register of potentially and definitely contaminated sites, made available to the public, free of charge, in the form of an online georeferenced spatial database ..."

Implementation deadlines:

- Member States have until 17 December 2029 to set up the register of contaminated sites *(Art. 17(1)).*
- The first soil health assessment doesn't have to be carried out until 17 December 2031 (after which, every six years) *(Art. 10(1), par.2).*
- And the deadline for the all-important identification and recording in the Register of potentially contaminated sites is 17 December 2035 *(Art. 14(3)).*

Those dates can seem frustrating, but it's what Mr Hojsík had to do to get the law across the line and the clock ticking.

Other provisions of note

An ***EU digital soil health data portal*** *(Art. 6(5))*

Obligation to establish ***sampling points*** and methodologies for determining their number and location *(Art. 9 & Annex II, Part A))*

Member State and European Commission ***soil archives*** *(Art. 9(11))*

A provision on Member State encouragement and ***support for landowners*** and land managers in improving soil health and resilience, *but no obligation on Member States to provide funding (Art. 11),* plus a reference to Union funding which is just existing EU financial programmes with no fresh money *(Art. 18)*

Land take mitigation principles that are just that – principles *(Art. 12)*

Site-specific risk assessment and management of contaminated sites - Member States must take appropriate risk reduction measures but in deciding on 'appropriateness', they can take account of cost-benefit, technical feasibility of available risk reduction measures, etc. *(Art. 16)*

Michael MacBrien, Editor

COVER ARTICLES

Code rain

#01 MODERN INTANGIBLES AND EUROPE'S COMPETITIVENESS CHALLENGE

Stefanos Mamakis

EDITOR'S NOTE

Stefanos Mamakis

This groundbreaking paper addresses one of the EU's most crucial challenges: How can modern intangible assets be developed and scaled within the Union in a way that strengthens its competitiveness and enhances the welfare of its society?

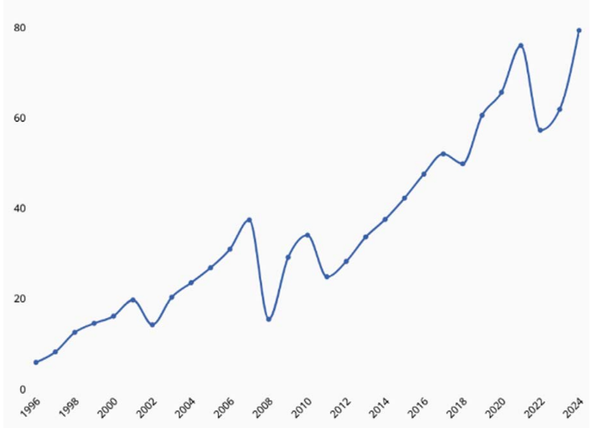
The article focuses on modern intangible assets - such as AI models, data and software systems - and highlights the growing disconnect between their economic importance and the institutional frameworks through which they are recognised, valued and financed in the European Union. While international practice shows that such assets can be successfully developed, validated and financed under coherent institutional arrangements, the paper argues that, in the EU, fragmentation across legal recognition, valuation practice, prudential treatment and financing mechanisms creates structural bottlenecks.

After a didactic exposé of the objective conditions for the financing of modern intangibles and their valuation (unfolding through successive stages of maturity, reflecting a gradual reduction of technological, organisational and market uncertainty), the author reviews the EU's strengths in the legal protection of intangible rights and weaknesses in their treatment as economically reliable assets.

He then proposes an EU-level institutional framework that aligns the financing chain of modern intangible assets with their economic lifecycle, founded on four pillars:

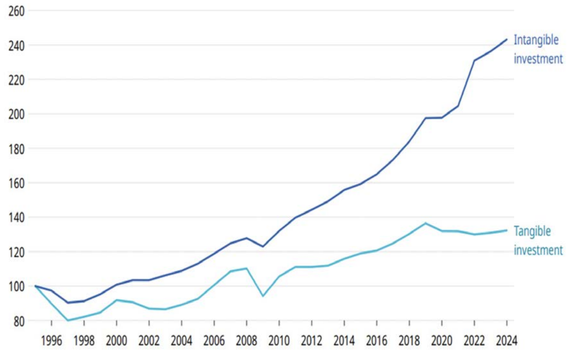
- Legal recognition and protection
- A valuation framework (soon to materialise in EVS-BV's European Intangible Asset Valuation Standard)
- A financial framework
- And EU-level policy and funding

Economic value creation is increasingly driven by modern intangible assets such as artificial intelligence models, proprietary databases and software systems. International evidence shows that investment in knowledge-based and data-driven capital has grown steadily over recent decades, often outpacing investment in traditional tangible assets. These intangibles are no longer auxiliary inputs but constitute core productive resources capable of generating scalable and recurring cash flows.



Source: WIPO, The Value of Intangible Assets of Corporations Worldwide Rebounds to All-Time High of USD 80 Trillion in 2024, 28 February 2025.

Fig. 1: Global Corporate Intangible Value (USD trillion)



Source: WIPO – LBS Global INTAN-invest database, July 2025

Fig. 2: Total Intangible and Tangible investment, 1995-2024 (1995=100)

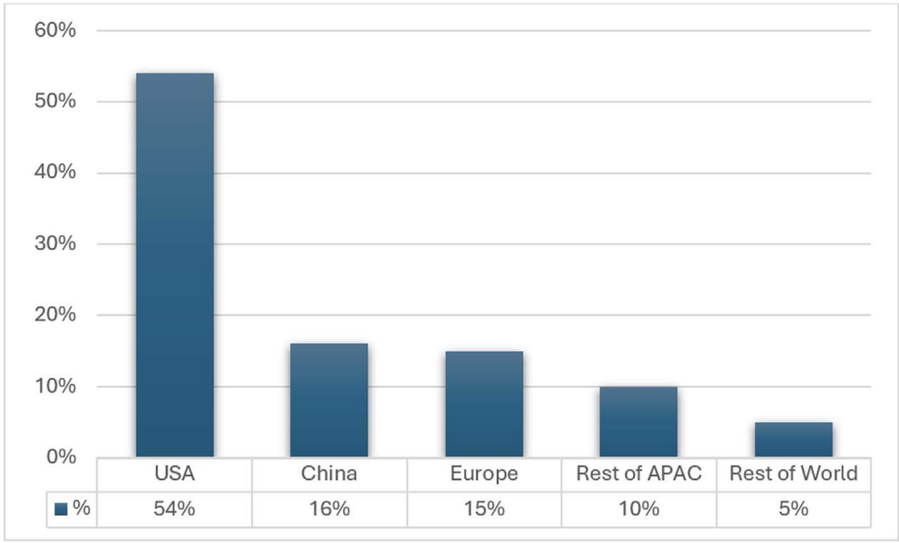
Evidence (WIPO *and Luiss Business School*,2025) points to a **profound and sustained shift in global value creation towards intangible assets.** Global investment in intangible assets reached t USD 7.6 trillion in 2024, increasing by around 3% in real terms compared to 2023, at a time when investment in tangible assets remained broadly flat. Over the longer period 2008–2024, intangible investment expanded at a pace roughly 3.7 times faster than tangible investment, confirming a structural reallocation of capital. Within this trend, software and databases have been the fastest-growing category of intangible assets, recording annual growth rates above 7% between 2013 and 2022, and exceeding 9% in the period 2021–2022.

Consistent with these developments, intangible investment increased its share of global GDP from approximately 10% in 1995 to about 13.6% in 2024, while the share of tangible investment declined.

The development of modern intangible assets has implications that extend well beyond individual firms. Evidence from the OECD (*Demmou et al.*, 2019) consistently links investment in knowledge-based and data-driven capital to **higher productivity, more efficient resource allocation and stronger long-term economic growth.** By enabling automation, improved decision-making and the scaling of services at low marginal cost, these assets support **gains in competitiveness** that translate into **broader economic welfare.** At the same time, research by the World Intellectual Property Organization (WIPO) (WIPO and Luiss Business School,2025) highlights that intangible-intensive activities play an increasing role in **high-paying job creation, value-added growth and the diffusion of innovation across sectors.** Where such assets are successfully developed and deployed, **their benefits tend to spill over to society** through improved services, lower costs, enhanced resilience and new economic opportunities.

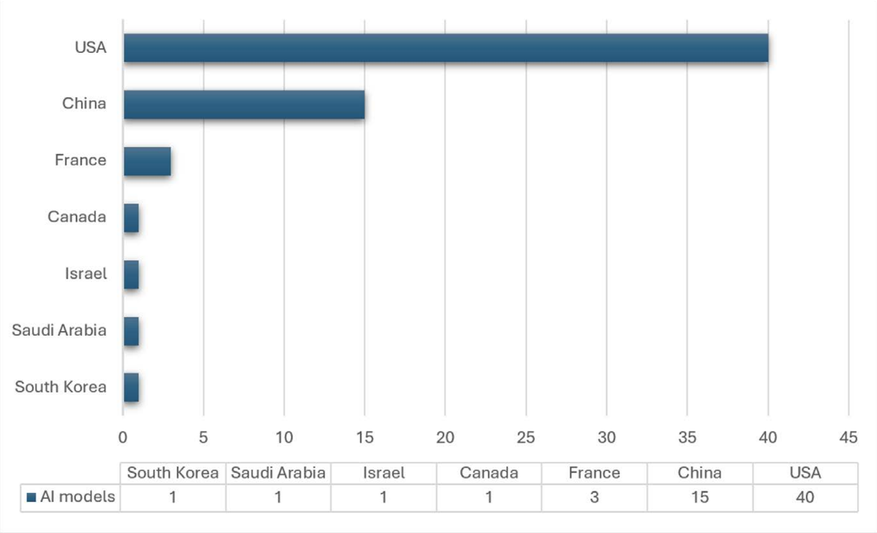
Recent evidence (WIPO and Luiss Business School, 2025) also indicates that the development of modern intangible assets is strongly shaped by the geographical concentration of capital, particularly in AI-, data- and software-intensive activities. In absolute terms, **the United States remains the dominant hub** of intangible capital formation reaching approximately USD 4.7 trillion in 2024 - a level described as nearly twice the combined intangible investment of France, Germany, the United Kingdom and Japan. By comparison, Europe's largest economies individually record substantially smaller volumes, with France at USD 631 billion and Germany at USD 602 billion in the same year.

This concentration gap is even more pronounced in **AI-related intangibles**, where private capital plays a critical role. Private AI investment in the **United States** reached **USD 109.1 billion** in 2024, compared with **USD 9.3 billion in China** and **USD 4.5 billion in the United Kingdom** (Maslej et al., 2025). Furthermore, the **United States** absorbed close to **90%** of total private AI funding in the first nine months of 2025, while **Europe** accounted for only around **3.8%** (Cesareo et al., 2025). Moreover, in 2024, U.S.-based institutions produced 40 notable AI models, significantly outpacing China's 15 and Europe's 3 (Maslej et al., 2025). Taken together, these figures illustrate the markedly smaller scale of capital mobilised in Europe's AI and data-driven sectors compared with the rest of the world.



Source: Synergy Research Group

Fig. 3: Hyperscale data center capacity - Q4 2024



Source: Epoch AI, 2025 | Chart: 2025 AI Index report

Fig. 4: Number of notable AI models by select geographic areas, 2024

Beyond the United States, a number of **non-European economies play an increasingly important role** in specific segments of modern intangible assets. **India** has emerged as a global hub for software- and service-based AI applications; **Singapore** functions as a leading centre for AI deployment, governance and regional coordination; the **United Arab Emirates** has invested heavily in sovereign AI models and data infrastructure; while **Brazil** represents a growing regional hub for software and data-driven services in Latin America. Although these ecosystems differ in scale and structure, they further underline the global dispersion of intangible value creation beyond the traditional OECD core.

Taken together, these developments point to a **structural intensification of global competition** around modern intangible assets. Leading ecosystems are not only accumulating larger volumes of AI-, data- and software-related capital, but are also reinforcing their positions through scale effects, faster innovation cycles and cumulative investment dynamics. While such assets are present across the European Union, the relative fragmentation of capital and infrastructure constrains Europe's capacity to compete with more concentrated non-European ecosystems in the race to develop, scale and anchor high-value intangible activities.

As a result, the **European Union** - while advanced in regulatory governance of technology and data - appears yet to develop a coherent set of policies aimed at actively encouraging the development and scaling of modern intangible assets in support of broader economic growth.

This raises a critical question: **How can modern intangible assets be developed and scaled within the European Union in a way that strengthens its competitiveness and enhances the welfare of its society?**

WHAT MAKES AN ASSET INTANGIBLE - AND MODERN

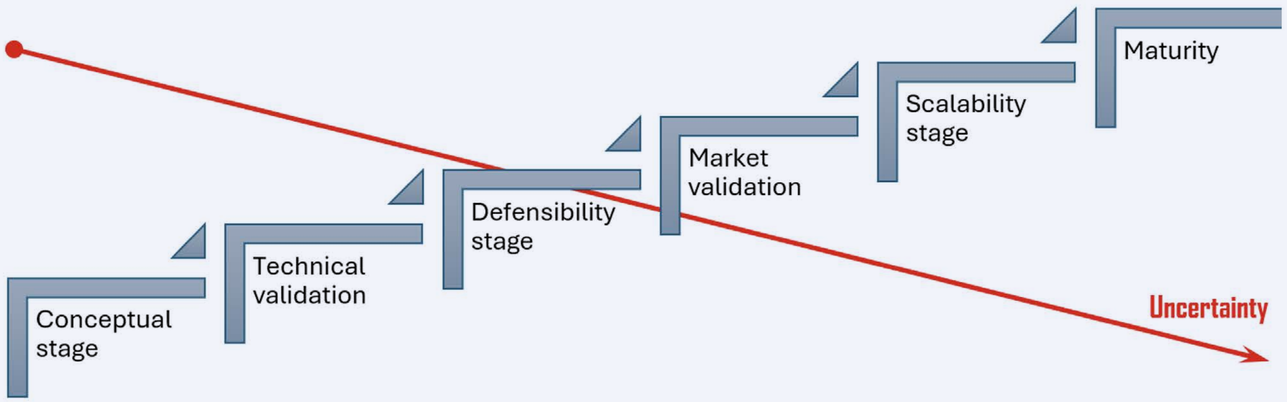
Modern intangible assets extend beyond traditional registered Intellectual Property Rights (IPR) such as patents, trademarks and designs. European Union Intellectual Property Office (EUIPO) survey evidence indicates that registered IPRs cover only a minority of European SMEs: 10% of EU SMEs report owning registered IP rights, while many rely on other protection measures, including domain names/other alternative measures (39%), trade secrets (19%), and database rights (13%) (EUIPO, 2022). Thus, a substantial part of value in data-, software- and model-driven business activities is embodied in assets that **are protected** (and monetised) through **a mix of formal rights and non-registered mechanisms**.

Artificial intelligence models, proprietary databases, software systems and digital infrastructures exemplify this shift. **Their economic value is tied to functionality and operational deployment:** models improve through training and iteration; databases gain value through accumulation, curation and integration; software evolves through updates, security maintenance and continuous use. These assets behave less like static IP titles and more like **dynamic productive systems**, whose performance depends on ongoing investment, governance and integration into business processes.

The value of modern intangible assets unfolds through successive **stages of maturity**, reflecting a gradual reduction of technological, organisational and market uncertainty. At an initial **conceptual stage**, the asset exists as an idea, algorithm or system design, with value dependent on technical feasibility. This is followed by **technical validation**, where functionality is demonstrated through prototypes or proof-of-concept deployments. As development progresses, a **defensibility stage** emerges, characterised by the accumulation of proprietary data, know-how and system integration that transforms the technology into a protectable economic resource. **Market validation** subsequently links the intangible to potential cash flows through early users or pilots, without requiring full commercial scale. At the **scalability stage**, the asset demonstrates repeatable deployment and cost-efficient expansion, increasingly behaving as a platform. Finally, at **maturity**, the intangible supports predictable revenue streams and long-term use, functioning as a stable productive asset. This lifecycle perspective underscores that modern intangibles are dynamic systems whose value depends on continuous investment and successful progression across distinct stages of maturity.

"The value of modern intangible assets unfolds through successive stages of maturity, reflecting a gradual reduction of technological, organisational and market uncertainty."

Figure 5: Stages of modern intangible assets' maturity



Source: Author's own elaboration based on the analysis presented in this paper

Crucially, when modern intangible assets successfully progress through these stages of maturity, they cease to function merely as development costs and become measurable drivers of firm-level economic value. EUIPO–EPO analysis links intangible ownership - captured through IPR portfolios - to stronger economic performance at firm level, reporting higher revenues per employee, higher employment and higher wages among IPR-owning firms than among firms without an IP portfolio (EUIPO and EPO, 2025).

Together, these findings support a practical framing: **modern intangible assets should be treated as productive economic resources with measurable performance relevance** - provided that the institutional environment can recognise, protect and support them appropriately.

FROM INTANGIBLE CREATION TO ECONOMIC SCALE

The development and scaling of modern intangible assets are shaped by a combination of **technological, organisational, institutional and economic factors**. None of these factors operates in isolation; their effectiveness depends on how they interact and reinforce one another.

At a general level, the **key determinants** of modern intangible development include **access to data and its quality, computational infrastructure** and the **ability to scale technically, skilled human capital and organisational capabilities, the existence of markets and real-world applications**, as well as the **broader institutional and financial environment** within which these assets are created, governed and deployed. This environment shapes not only the availability of resources, but also the conditions under which intangible investments can be sustained, coordinated and scaled over time.

Within this broader institutional and financial context, two elements play a distinct and enabling role**: legal recognition and protection, and access to finance**. These factors do not merely constitute additional inputs into the development process; they **operate horizontally across all other drivers**. While they do not substitute for data, technology or skills, **they determine whether investments in these areas can be transformed into investable, scalable and economically productive assets**, rather than remaining isolated technical capabilities or organisational costs.

In the absence of adequate **legal recognition, protection and enforceability**, modern intangible assets remain difficult to define, transfer and monetise, increasing the risk of value erosion and discouraging long-term investment. Similarly, without **appropriate access to finance**, their development tends to remain fragmented and sub-scale, limiting their ability to reach the level of maturity and diffusion required to support competitiveness and long-term economic growth.

"In the absence of adequate legal recognition, protection and enforceability, modern intangible assets remain difficult to define, transfer and monetise, increasing the risk of value erosion and discouraging long-term investment."

WHEN INTANGIBLES BECOME ASSETS: LEGAL RECOGNITION, PROTECTION AND ENFORCEABILITY

International Practice

Across leading jurisdictions, the legal treatment of intangible assets extends beyond their formal protection as intellectual property rights. Legal frameworks increasingly address three interrelated dimensions: the **recognition** of intangibles as legally cognisable economic assets, their **protection** against misappropriation, and their **enforceability** in contractual, commercial and insolvency contexts.

International reference frameworks, such as the UNCITRAL work on secured transactions, reflect this functional approach by treating intangible assets as movable property capable of being transferred, licensed or relied upon in legal relations, while emphasising clear rules on publicity, priority and third-party effects. In practice, common-law systems illustrate this broader integration: in the United States and the United Kingdom, for example, intangible assets are routinely recognised as transferable property interests, enforced through contract and commercial law, and incorporated into insolvency proceedings as part of the debtor's estate.

The EU Framework

At the level of substantive rights, **the European Union provides a relatively advanced legal framework for the protection of certain categories of intangible assets.** Instruments such as the **Database Directive** and the **Trade Secrets Directive** define protectable subject matter and provide remedies against misappropriation, while the work of the **EUIPO** contributes to the monitoring, analysis and economic understanding of intellectual property-intensive activities across the Union. From this perspective, the **EU exhibits a high degree of regulatory maturity in the governance of intellectual property and related intangible rights.**

However, when modern intangible assets are considered as economic assets rather than solely as protected rights, the legal picture becomes more fragmented. The rules governing the creation, publicity, priority and enforcement of security interests over non-financial assets - including intangibles - remain largely within the competence of Member States. This fragmentation becomes particularly relevant in **enforcement and insolvency scenarios**, where the economic reliability of intangible assets is effectively tested.

EU policy initiatives in the field of insolvency explicitly acknowledge that divergences in national frameworks increase legal uncertainty and reduce the attractiveness of cross-border investment (*European Commission*, 2022). While these initiatives do not address intangible assets directly, they underline a broader institutional challenge: the absence of uniform and predictable conditions under which assets - tangible or intangible - can be relied upon by creditors and investors across the Union.

Taken together, the evidence suggests that the EU combines strong legal protection of intangible rights with uneven conditions for their treatment as economically reliable assets. This gap between protection and enforceability constitutes a structural constraint on the role that modern intangible assets can play in financing and scaling economic activity at European level.

"... the EU combines strong legal protection of intangible rights with uneven conditions for their treatment as economically reliable assets."

FINANCING INTANGIBLES: FRAMEWORKS, PATHWAYS AND GAPS

Why Modern Intangibles Are Hard to Finance

Despite their growing economic relevance, **modern intangible assets remain difficult to finance within traditional financial systems.** Unlike tangible assets, their value is inherently uncertain, highly dependent on future use, and exposed to rapid technological obsolescence. Cash flows are often indirect, contingent on scale, and sensitive to execution risk, which complicates credit assessment and risk pricing.

From a lender's perspective, modern intangibles also **raise practical concerns**. Their valuation lacks standardisation, their legal treatment varies across jurisdictions, and their recoverability in default scenarios is often unclear. As a result, **they do not fit easily into conventional collateral frameworks** designed around physical assets with observable markets and predictable liquidation values. Even where legal protection exists, the gap between protection and enforceability increases perceived risk, leading financial institutions to discount or exclude such assets from lending decisions.

The outcome is not the absence of investment in intangibles, but its **concentration in financing channels willing and able to absorb higher risk.** Where such channels are underdeveloped, firms rich in modern intangibles tend to face capital constraints that limit their ability to scale.

International Practices in Financing Modern Intangibles

In the **United States**, the financing of modern intangible assets is structured as a **continuous and highly sequenced chain that supports development well before commercial maturity.** Early-stage technological risk is absorbed through a **combination of non-dilutive public research funding and private early risk capital**, enabling assets to reach technical validation without immediate commercial pressure. **Accelerators and angel investors** play a critical intermediary role by providing early equity financing while simultaneously acting as institutional signals that reduce information asymmetries. As uncertainty declines and early evidence of market relevance emerges, venture capital finances scaling, while **venture debt and bank lending** become available only once the intangible demonstrates defensibility, repeatability and a credible path to monetisation. Crucially, this financing structure is underpinned by deep and **liquid public equity markets**, which - although not a source of early-stage funding - provide credible exit and valuation mechanisms.

In China, the financing of modern intangibles follows **a distinct, state-orchestrated model** in which public authorities play a central role in directing capital toward strategic modern intangible assets. Early-stage development is supported through **state-backed funds, public research programmes and policy-guided venture capital**, often in close alignment with national industrial objectives. **Private capital participates within this framework**, particularly at later stages, but strategic relevance and alignment remain decisive factors. By contrast, other leading economies - including Singapore, the United Arab Emirates, India and Brazil - exhibit more market-oriented but still state-supported models. In these jurisdictions, governments typically share early **technological risk through grants, co-investment schemes or innovation hubs**, while **private venture capital and corporate investors** drive commercialisation and regional scaling. Although institutional designs differ, these systems consistently enable the development of modern intangibles prior to full market maturity.

Across these diverse jurisdictions, the successful financing of modern intangible assets rests on a set of clearly identifiable and recurrent structural features.

- ***First**, early-stage technological risk is deliberately **absorbed or shared by the public sector, or by institutions operating with public backing**, allowing experimentation and technical validation before commercial viability is required.*
- ***Second, bank lending and other forms of debt finance enter only after validation** has occurred, once the intangible demonstrates predictable performance and a credible path to monetisation.*
- ***Third**, systems consistently **distinguish between technological risk and commercial risk**: the former is addressed upstream through public support and early risk capital, while the latter is borne downstream by private investors as market relevance emerges.*
- ***Fourth**, in the **absence of tangible collateral**, financing relies on*

institutional signals of quality *- such as competitive grants, accelerator selection, pilot contracts or reputable investor participation.*

- ***Fifth****, financing follows a* ***sequenced progression aligned to the maturity of the intangible asset*** *itself, with distinct instruments corresponding to successive stages of uncertainty reduction.*
- ***Sixth****, there is an explicit acceptance that modern intangibles will* ***not be fully visible on balance sheets*** *during much of their development, and that valuation must therefore precede formal accounting recognition.*
- ***Seventh****, early risk-taking is anchored by the existence, or at least the credible expectation, of* ***exit channels through strategic transactions or public equity markets****.*
- ***Finally****, while the* ***state plays a catalytic role, it does not replace market mechanisms****; instead, it enables private capital to assume scaling and commercial risk once technological uncertainty has been reduced.*

Taken together, these features form **an effective financing chain** in which decisions are anchored **less in collateral value and more in the deliberate allocation of risk across investors and stages of asset maturity**, allowing modern intangible assets to be funded on the basis of expected scalability and long-term value creation rather than immediate asset liquidation.

"there is an explicit acceptance that modern intangibles will not be fully visible on balance sheets during much of their development, and that valuation must therefore precede formal accounting recognition."

EUROPE'S INSTITUTIONAL GAP

Despite significant aggregate investment in intangible assets, the financing of modern intangibles in the European Union **remains structurally constrained**. The difficulty does not stem from a lack of strategic intent, regulatory attention or public resources, but from a **persistent mismatch between the nature of modern intangible assets and the institutional frameworks through which finance is allocated**.

A first source of friction lies in the **project-based logic of public funding**. Although substantial resources are channelled through central EU programmes, these instruments are designed around **predefined projects, milestones and deliverables**. This structure is effective for research and technological upgrading but poorly aligned with the iterative and uncertain development path of modern intangibles, which requires flexibility and tolerance for failure. As a result, public funding often sustains technological activity without enabling the transition to investable and scalable assets.

This misalignment is further compounded by **institutional fragmentation across Member States.** National grant schemes, development banks and fiscal incentives vary widely in scope, scale and continuity, resulting in uneven early-stage support and limited cross-border scalability. In practice, the transition from national funding to EU-level financing is often discontinuous, as instruments are poorly aligned across stages of development. Consequently, promising intangible assets frequently encounter financing gaps precisely at the point where technological uncertainty remains high but potential economic value begins to crystallise.

A further constraint stems from the **absence of a commonly accepted modern valuation framework** for modern intangible assets. AI models, data assets and software systems are typically developed without observable cash flows and remain largely off balance sheet, limiting the ability of investors and lenders to articulate, price and transfer risk. In response, capital allocation relies on conservative proxies - delaying venture investment, excluding debt finance and reinforcing cost-based public funding - thereby creating not only a financing gap, but a structural valuation gap that constrains the scaling of intangible-driven growth.

The structure of European capital markets further reinforces these constraints. Risk-bearing capital is fragmented and frequently subject to public or quasi-public mandates that limit tolerance for pre-revenue uncertainty and constrain follow-on investment. Debt finance, in turn, enters too late - if at all - given the absence of collateral, predictable cash flows or mature venture debt mechanisms. As a result, Europe lacks a coherent financing sequence through which risk can be progressively transferred, hindering the transition of modern intangible assets from technological promise to economic scale.

Finally, **demand-side mechanisms play a limited role in validating early-stage intangibles**. Public procurement and the early use of new digital solutions by large public or regulated organisations—powerful tools for reducing market uncertainty in other ecosystems—are rarely used to support emerging data- and software-based assets. In the absence of reference customers or real-world deployment, even technically sound intangibles face delayed market validation, which in turn weakens their ability to attract private capital.

Taken together, these factors constitute a **distinct institutional gap**. Europe does not lack innovation, nor does it lack investment in intangible assets per se. Rather, **it lacks a coherent institutional environment capable of recognising modern intangibles as evolving productive assets and financing them accordingly**. The consequence is a structural bias toward in-house intangible investment by established firms - supported by internal cash flows and traditional financing - while independent startups and new entrants face persistent barriers at the very stages where modern intangible value is created.

BUILDING AN ENABLING FRAMEWORK FOR MODERN INTANGIBLES IN THE EU

The above analysis points to a clear conclusion: **Europe's challenge in scaling modern intangible assets is not rooted in a lack of innovation, but in the absence of a continuous and coherent economic framework that allows such assets to move from early development to market-based financing.** Where the dominant source of value is intangible, discontinuities in recognition, valuation and financing translate directly into lost scale, delayed deployment and weaker competitiveness. In practice, these gaps do not merely slow growth; they **actively discourage startups** from taking promising intangible-based products beyond early stages or push them to relocate development and commercialisation to more financing-friendly jurisdictions.

Addressing this challenge requires an **EU-level institutional framework that aligns the financing chain of modern intangible assets with their economic lifecycle. Legal recognition** establishes the asset's identity at early stages, **public support** absorbs initial uncertainty and enables validation, **valuation** progressively translates technical progress into economic terms, and **market-based financing** enters as residual risk declines. By sequencing financing instruments to the maturity of the intangible itself, such a framework preserves continuity, reduces uncertainty step by step, and allows private capital to engage without weakening market discipline.

"A strengthened role for the EUIPO in the recognition and registration of data-, software- and model-based assets would provide a common European reference point, analogous to existing IP titles."

Legal recognition and protection constitute the first pillar of such an institutional framework. A strengthened role for the EUIPO in the recognition and registration of data-, software- and model-based assets would provide a common European reference point, analogous to existing IP titles. Importantly, such recognition would need to be **periodically re-confirmed** as the asset progresses through successive stages of maturity, preserving legal clarity as uncertainty declines and economic relevance increases. This process would not imply a guarantee of value, but it would establish and preserve the legal identity of the asset, clarify control and usage rights over time, and create a credible foundation upon which valuation and financing can rest.

The second pillar is a valuation framework capable of translating technical progress into economic terms. Modern intangibles typically reach functional maturity before generating stable cash flows and remain largely outside traditional accounting statements. In this context, **the near-completed evolution of TEGOVA's European Valuation Standards - Business Valuation (EVS-BV) now comprising a European Intangible Asset Valuation Standard** offers a practical opportunity to establish a shared language for assessing the economic potential of modern intangibles within the European institutional context. **Designed to be compatible with EU legal, supervisory and market structures**, EVS-BV provides valuation approaches that are both methodologically robust and operationally usable across Member States. By focusing on expected performance, scalability, risk drivers and governance, valuation can serve as a bridge between early-stage uncertainty and market-based financing, allowing risk to be priced rather than avoided.

The third pillar concerns the financial framework, particularly the conditions under which banks and long-term lenders can engage. Commercial banks are not positioned to absorb early technological uncertainty, but they can participate once uncertainty has been sufficiently reduced and structured. This requires supervisory clarity and consistent treatment of intangible-backed exposures within the prudential frameworks overseen by the European Central Bank and the European Banking Authority. Under such conditions, properly recognised and valued intangible assets may support financing as collateral, potentially complemented by partial guarantees, risk-sharing mechanisms or interest-rate support where residual uncertainty remains.

The fourth pillar is EU-level policy and funding, acting in a catalytic rather than substitutive role. At early stages, EU intervention is economically justified where uncertainty is too high for private capital, provided that access be conditional on asset-level recognition and subject to progressive validation. As assets mature, public funding should decline and give way to market financing, ensuring continuity rather than dependence. In this way, EU instruments help preserve the financing chain across borders and stages of development, without displacing private initiative.

Taken together, these four pillars define a **pragmatic pathway** for strengthening Europe's capacity to develop and scale modern intangible assets. Legal recognition creates economic identity; valuation translates uncertainty into measurable risk; financial frameworks enable cautious market participation; and EU policy ensures continuity where markets alone cannot yet operate. Under such an enabling framework, modern intangibles can progress from early innovation to scalable economic assets, supporting both European competitiveness and broader societal welfare.

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#02 HOW ARTIFICIAL INTELLIGENCE WILL TRANSFORM PROFESSIONAL VALUATION

Aleksandra Przegalińska

Aleksandra Przegalińska

ABSTRACT

As artificial intelligence increasingly permeates professional services, the valuation profession stands at a pivotal crossroads. This article examines how AI will transform valuation work, drawing on original research into human-AI collaboration and the psychological impacts of AI system design. Rather than viewing AI as a replacement threat, I argue for a **collaborative AI** paradigm where human expertise and algorithmic support work in concert. Our research reveals that **how** AI systems are designed—their persona, interaction style, and behavioural characteristics—profoundly affects professional performance, trust, and wellbeing. For valuers, the implications are clear: the future belongs not to those who resist AI, nor to those who defer to it entirely, but to professionals who learn to collaborate effectively with intelligent systems while maintaining their irreplaceable professional judgment.

THE AI REVOLUTION IN PROFESSIONAL SERVICES

Artificial intelligence is not new. Its conceptual foundations stretch back nearly a century to the pioneering work of Alan Turing, and the field has experienced multiple cycles of enthusiasm and disappointment—the infamous "AI winters"—before reaching its current moment of unprecedented capability and adoption. What has changed is not AI itself, but its accessibility, sophistication, and relevance to knowledge work.

For valuation professionals, this transformation arrives laden with both promise and anxiety. Algorithms can now analyse vast datasets, identify comparable properties across jurisdictions, detect anomalies in financial statements, and generate preliminary assessments in seconds. The question that haunts every professional conference and industry publication is stark: Will AI replace the valuer?

The answer, I believe, is both no and yes—depending entirely on how we frame the question. AI will not replace valuers who evolve to work with intelligent systems. But it may well marginalise those who cling to purely manual methods or, conversely, those who abdicate their professional judgment to algorithmic outputs. The path forward lies in understanding what I call **Collaborative AI**—a paradigm shift from viewing AI as either tool or threat to recognising it as a collaborative partner in professional practice.

THE EVOLUTION OF GENERATIVE MODELS

The current wave of AI capability is driven primarily by large language models (LLMs) and generative AI systems. These technologies represent a fundamental shift from earlier AI approaches that required explicit programming for specific tasks. Modern generative models learn patterns from vast corpora of text, images, and data, enabling them to perform a remarkable range of tasks with minimal task-specific training.

The landscape includes both commercial offerings—such as GPT-4, Claude, and Gemini—and a growing ecosystem of open-source alternatives. Particularly relevant for European professionals is the emergence of European language models designed with European values, languages, and regulatory frameworks in mind. Projects like EuroLLM, Mistral, and various country-specific models (including Poland's PLLuM) represent efforts to ensure that AI development reflects diverse perspectives and serves European needs.

For valuers, these developments mean that AI assistance is no longer confined to large firms with substantial technology budgets. Capable AI tools are increasingly accessible to practitioners of all sizes, creating both opportunities for enhanced service delivery and competitive pressures to adopt new methods.

"Particularly relevant for European professionals is the emergence of European language models designed with European values, languages, and regulatory frameworks in mind. Projects like EuroLLM, Mistral, and various country-specific models (including Poland's PLLuM) represent efforts to ensure that AI development reflects diverse perspectives and serves European needs."

FROM INTERACTION TO COLLABORATION

My research over the past decade has focused on a fundamental question: How do humans and AI systems work together most effectively? This inquiry has taken me from MIT's Center for Collective Intelligence to Harvard's Center for Labor and a Just Economy, and has produced findings published in journals *including Future Generation Computer Systems, Business Horizons, and the International Journal of Information Management*.

The central insight emerging from this work is the distinction between *interaction* and *collaboration*. Interaction implies a tool-user relationship: the human commands, the machine executes. Collaboration implies something richer—a genuine partnership where both human and AI contribute distinct capabilities toward shared goals.

Collaborative AI refers to systems designed to work *with* humans rather than *instead* of them, combining human judgment, creativity, and social intelligence with machine efficiency and data-driven insights. The goal is not automation but co-creation and augmentation, where humans and AI collaborate to make better decisions, solve complex problems, and learn from each other in real time.

COLLABORATIVE AI FOR VALUATION PROFESSIONALS

What does collaborative AI mean in practice for property and asset valuers? The applications span the entire valuation workflow.

AI systems can shift valuation from periodic assessments to continuous, data-driven monitoring. Algorithms can flag anomalies and unusual patterns in market data, transaction records, or property characteristics far faster than traditional review methods. Generative AI tools can summarise complex legal documents, planning regulations, lease agreements, and financial statements in seconds, allowing valuers to focus their expertise on interpretation rather than extraction.

AI can assist in tracing data lineage, identifying potential compliance risks, and ensuring that valuation methodologies align with applicable standards. For complex properties, AI can generate initial comparable analyses that valuers then refine based on local knowledge and professional judgment.

Yet—and this is crucial—**human judgment remains central**. Professionals interpret context, understand intent, navigate ethical complexities, and exercise the discretionary judgment that clients and courts rely upon. The greatest value lies not in full automation but in human-AI collaboration, where each contributes what they do best.

THE HIDDEN VARIABLE: AI PERSONA AND PROFESSIONAL PERFORMANCE

While much attention focuses on AI accuracy and efficiency, our research has uncovered an equally important but often overlooked factor: the persona and behavioural characteristics of AI systems. As AI tools increasingly adopt persona-like behaviours—in chatbots, assistants, training systems, and what might be termed "AI supervisors"—designers and organisations must recognise that persona design is fundamentally a human-impact decision.

The stakes are significant. An overly cautious AI system can become an annoying, unhelpful gatekeeper that frustrates professionals and impedes productivity. At the other extreme, a persona-driven system can manifest as manipulative or even hostile. Our research explored what happens when an AI is explicitly designed *not* to work in the user's best interest.

In what the media have dubbed our "Evil Boss Study," we conducted controlled experiments using purposefully contrasting AI personas grounded in established leadership theories. We compared a supportive **Servant Leader** chatbot—designed to be empathetic, empowering, and people-first—with an antagonistic **Dark Triad** leader chatbot embodying manipulative, narcissistic, and psychopathic traits.

Research Hypothesis and Findings

Our hypothesis was that as AI agents become more autonomous, their interactional style becomes a primary determinant of their success and ethicality. An AI that is merely functional is insufficient; a behaviourally toxic AI, even if effective at completing tasks, can degrade user performance, creativity, and wellbeing by undermining psychological safety.

The results were striking. Participants collaborating with the supportive Servant Leader chatbot, compared to those working with the Dark Triad chatbot, reported significantly lower frustration across all experimental tasks. More importantly, we measured *psychophysiological* responses—not just what people said, but how their bodies responded. The data confirmed that AI persona have measurable physiological impacts on human collaborators.

We also documented distinct patterns in how participants responded to different AI personas. With supportive AI, users engaged more deeply with tasks, asked more questions, and demonstrated greater negotiation behaviours. With antagonistic AI, users showed higher rates of resistance, coping behaviours, and—notably—attempts to "jailbreak" the system or circumvent its instructions.

IMPLICATIONS FOR THE VALUATION PROFESSION

These findings carry significant implications for how valuation organisations should approach AI adoption. It is not enough to select AI tools based solely on technical capability or accuracy. The user experience—how the AI communicates, responds to queries, handles uncertainty, and supports professional judgment—matters enormously for both productivity and professional wellbeing.

For individual valuers, this research underscores the importance of critically evaluating the AI tools you use. Does the system support your professional autonomy, or does it position itself as an authority to be deferred to? Does it explain its reasoning in ways that enhance your understanding, or does it present conclusions as black boxes? Does it acknowledge uncertainty and invite your expertise, or does it project false confidence?

For professional bodies and regulators, the implications concern standards and guidance for AI use in valuation practice. Requirements for transparency, explainability, and human oversight are not merely technical specifications—they are safeguards for professional judgment and client protection.

“It is not enough to select AI tools based solely on technical capability or accuracy. The user experience … matters enormously …”

LOOKING AHEAD: DIGITAL TWINS AND THE FUTURE OF PRACTICE

Beyond current applications, emerging technologies point toward even more profound transformations. The concept of **digital twins**—virtual replicas of physical assets, processes, or even organisations—offers possibilities for real-time valuation monitoring, scenario analysis, and predictive assessment that were previously unimaginable.

Imagine a digital twin of a commercial property that integrates real-time data on occupancy, energy consumption, maintenance requirements, market conditions, and tenant creditworthiness. Such a system could continuously update value assessments, flag emerging risks, and model the impact of various scenarios—all while the human valuer provides strategic interpretation, client counsel, and professional judgment.

Through initiatives like the EUonAIR European University Alliance and the emerging MyAI University project, academic institutions across Europe are working to prepare the next generation of professionals for this collaborative future. The goal is not to train people to be replaced by AI, but to develop the distinctly human capabilities—critical thinking, ethical reasoning, creative problem-solving, interpersonal skills—that will remain essential regardless of technological advancement.

CONCLUSION: PROFESSIONAL AUTONOMY IN AN ALGORITHMIC AGE

The transformation ahead is not optional. AI will reshape valuation practice just as it is reshaping every knowledge profession. The choice that remains is how we navigate this transformation—whether we do so thoughtfully, maintaining the professional autonomy and ethical foundations that give our work meaning and value, or whether we drift passively into whatever arrangement technology companies and market forces happen to produce.

The evidence from our research is clear: the design of AI systems matters profoundly. Well-designed collaborative AI can enhance professional performance, reduce frustration, and support better outcomes for clients and markets alike. Poorly designed AI—even if technically capable—can undermine the very expertise it purports to augment.

For valuers, the path forward requires neither uncritical embrace nor reflexive resistance to AI. It requires the same qualities that have always defined excellent professional practice: rigorous analysis, sound judgment, ethical commitment, and continuous learning. The tools are changing. The fundamentals endure.

The future of valuation is collaborative. The question is not whether AI will be part of professional practice, but whether professionals will shape that collaboration to serve their clients, their profession, and the public interest. That outcome is not determined by technology. It is determined by choices we make today.

Professor Aleksandra Przegalińska is Vice-Rector for Innovation and AI at Kozminski University in Warsaw and a Research Fellow at Harvard University's Center for Labor and a Just Economy. She leads the Human-Machine Interaction Research Center and chairs Poland's "TOP100 Women in AI" initiative. Her books include *Collaborative Society* (MIT Press) and *Converging Minds*. This article is adapted from her keynote presentation at the Slovenian Institute of Auditors conference in Ljubljana.

PROPERTY VALUATION

8th edition of "Property Valuations: Real Estate Culture and Market", Mantua, 18th September 2025, organised by E-Valuations

#03

Residential Property Value: from European rules to professional practice

Angelo Donato Berloco

Mauro Iacobini

Editor's note:

This article's novel approach to residential mortgage valuation under the CRR and EVS was first presented by the authors at the 8th edition of "Property Valuations: Real Estate Culture and Market" in Mantua on 18 September 2025, organised by E-Valuations, the Italian association of independent property valuers (member of TEGOVA).

The historical and regulatory perspective (part 1) and the challenges for valuers in implementing the approach (part 3) are the work of **Dr. Angelo Donato Berloco**, President of E-Valuations.

The approach itself is presented (part 2) by its lead developer, **Mauro Iacobini**, Past National Head of Appraisal Services at the Italian Revenue Agency and lecturer in property appraisal.

Introduction

Regulation (EU) 2024/1623 (the Capital Requirements Regulation, CRR) and European Valuation Standards (EVS) 2025 are a decisive step towards a common methodology for determining the prudential value of properties used as collateral for bank loans.

Under the CRR, the concept of 'Property Value' and its associated 'prudently conservative valuation criteria' emerge as a key reference for European valuers, who are expected to combine technical rigour, prudence and market forecasting ability.

This article charts a pathway from European regulation to professional practice, with a particular focus on **Residential Property Value (RPV)**, proposing an operating model exclusively for residential valuation and reflecting on various cultural factors in the development of the valuer's role in Europe.

1. Property Value: from EVGN 2 to operating models

Recent history taught us the hard way that property valuation is more than just a secondary technical exercise.

The subprime mortgage crisis of 2008 revealed what happens when a financial system becomes detached from reality. It became clear that the absence of prudent, independent and realistic valuations can have a domino effect, bringing down banks, investors, real estate markets and the entire economy, harming households, businesses and governments. The lesson is clear: without a proper valuation culture, mortgage lending can become a systemic risk.

Europe now has an effective antidote: Property Value, a compass for lending and a benchmark for financial stability.

EVS 2025 provides a harmonised technical framework enabling valuers to meet the CRR's requirements: EVGN 2 "Valuation for mortgage lending: prudently conservative valuation criteria" sets down clear methodological principles for determining Property Value, an essential yardstick for the banking sector and risk management.

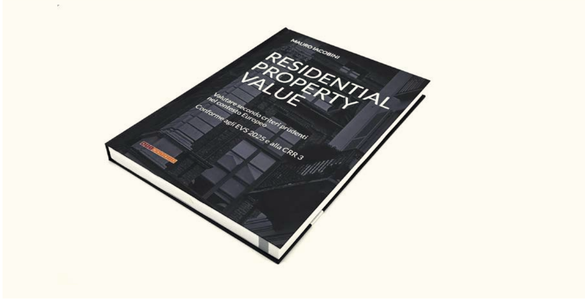
Property Value differs from Market Value, which represents the most likely exchange price under ordinary market conditions. By contrast, Property Value addresses a broader prudential question – is that Market Value sustainable over the entire life of the loan? "This radically alters the valuer's position from someone who provides a snapshot of the market to an analyst able to predict long-term risks and trends."[1]

How do we transition from theory to practice in the case of Property Value? One way is the 'STIMATRIX Model'. Though developed for the Italian residential sector, it's basic features are adaptable to other European valuation cultures.

2. A guide to Residential Property Value (RPV)

The model is designed both for expert valuers and anyone seeking to align themselves with the new EU rules and EVS, and is described at length in the publication "Residential Property Value – STIMATRIX 2025"[2]. The text proposes a step-by-step, transparent (white box) approach that guides the valuer from Market Value to RPV through a logical, verifiable process free of any arbitrary reductions (subjective haircuts).

The proposed methodology is based on verifiable quantitative tools ensuring technical rigour, compliance with CRR and EVS and the means to review the model, as opposed to simply black box.



Residential Property Value – STIMATRIX 2025

STIMATRIX srl is an Italian company specialised in technologies for real estate valuation. It produces the first Italian software fully compliant with EVS and Italian standards and credit sector guidelines.

The company positions itself as a proptech partner within the national valuation ecosystem, offering training, books, software, web apps, big data and professional expertise to technicians, real estate agents, consulting firms, banks, leasing companies, public entities and developers. With over 15 years of experience and a community of thousands of professionals, STIMATRIX develops solutions based on the methodologies and works of Prof. Marco Simonotti, a leading figure in the Italian real estate valuation field.

[1] TEGOVA Chairman Paulo Barros Trindade at the Mantua conference

[2] In Italian

The model is founded on two key pillars: quantitative analysis and Property Value forecasting, and ESG and regional risk assessment.

A. Quantitative analysis and Property Value forecasting

Identification and analysis of the regulatory sources that govern Property Value is followed by special statistical data analysis techniques that were chosen in order to comply with the prudential criteria set out in EU law and guidance. The aims of the statistical analysis are:

- to exclude growth forecasts (if property prices are rising, the valuer should question whether this trend is actually sustainable during the mortgage repayment period);
- to take into account the market cycle (where values have peaked, more realistic and conservative scenarios should be envisaged).

By analysing the historical series of property prices and using linear, multiple regressions and autoregressive integrated moving average (ARIMA) models, this method can be used to prudently estimate whether the market value is sustainable.

For the data used for the statistical analysis, the Osservatorio del Mercato Immobiliare (Italian Real Estate Market Observatory – OMI, part of the Italian Revenue Agency) provides half-yearly house price data for "OMI zones", or regions with homogeneous property values.

This valuable dataset – recognised by the Testo Unico Bancario (Italian Consolidated Banking Act) – can be used to analyse price trends at a local level. House prices can then be compared with the principal outstanding on a 20-year mortgage, for example.

The process essentially involves a comparison between the loan principal outstanding (calculated on the basis of a predetermined Market Value) and the lower end of the forecast ranges for house prices over the next five years, calculated at a local level using the above-mentioned econometric tools.

This method's conservative approach is justified by the fact that, to determine overall bank risk, the CRR provides for a low residential risk weight of 20% for a bank exposure of up to 55% of the Market Value. However, by adjusting the calculation parameters, all the various permutations of Market Value, Loan to Value and other parameters can be taken into account in the calculation model.

B. ESG and regional risk assessment

In addition to a prudent approach to aspects related to the local property market cycle, the model considers the principal risk factors (climatic, seismic, flood, landslide and transition risks), again using data from public sources.

For each type of risk, three key parameters are analysed: **site hazards, vulnerability of the building structure and economic exposure**.

The aim of the model is to quantitatively assess the potential impact of adverse events on the Property Value and thus on the stability of the collateral value, while simplifying the task for the valuer.

Readily available information sources are used wherever possible, together with any research helping to determine the hypothetical adverse impact on the property in question (both in terms of the costs of restoring the efficiency of the property and the probability of the event in relation to the duration of the bank exposure).

To quantify the potential impact of the various physical risks in monetary terms using the three key parameters (hazards, vulnerability, economic exposure) and to ensure that the model is applicable for individual independent valuers, there is a range of verifiable public sources from which to obtain the data to be processed on a case-by-case basis. For example, data from the OMI, the Istituto Nazionale di Geofisica e Vulcanologia (National Institute of Geophysics and Volcanology – INGV) and the Istituto Superiore per la Protezione e la Ricerca Ambientale (Institute for Environmental Protection and Research – ISPRA).

The theoretical discussion at the Mantua conference was accompanied by seven real-life case studies from different Italian regions, providing a step-by-step illustration of the method's practical application. In addition, the STIMATRIX team developed a software application that translates the model into a digital operating flow: the tool assists the valuer in calculating the RPV, speeding up the process without encroaching on the expert's role and professional accountability.

Operating model for determining Residential Property Value

1. Practice
2. Location
3. Cadastral data
4. Construction features
5. Dimensional and morphological characteristics
6. Risk parameters
7. Economic and appraisal data
8. Financial parameters of the mortgage
9. Sustainability indicators
10. **Results**

Residential Property Value		
Market Value		**Amount**
Market Value of the property		**250.000,00 €**
Sustainability	**Percentage incidence**	**Amount**
☑ *Correction for sustainability over time*	0,00 €	**0,00 €**
Physical risk / transition	**Percentage incidence**	**Amount**
☑ *Seismic risk*	1,52%	3.803,00 €
☑ *Hydraulic risk*	7,68%	19.200 €
☑ *Risk of landslides*	0,00 %	0,00 €
☑ *Transition risk*	1,80%	4.500,00 €
Property Value	**11,00%**	**222.497,00 €**

In conclusion, the Property Value of the property located in Mantua, via Pisacane is 222.497,00 € (**223.000,00 €** in round figure), with a final reduction of **10,80%** of the Market Value.

A practical example: if an apartment is valued at € 250,000 during a period of market growth, the Property Value could be estimated at € 223,000 to reflect the risk that its value may fall in future. It is not a case of arbitrarily reducing the value, but of encouraging a prudent approach to preserve the integrity of the credit system and economic stability in general.

Using the Market Value as a starting point, the application considers the entire or residual term of the bank exposure secured by the collateral, its location, property characteristics and the various risk profiles. The application then guides the valuer through each step of the RPV appraisal.

The software greatly facilitates the valuer's task; it does not replace valuers, but enables them to adjust those parameters that can only reasonably be set after the obligatory and essential fact-finding process (carried out both during property inspection and desktop analysis).

Going forward, a collaboration is under way with the **University of Pisa** to incorporate **artificial intelligence** algorithms into the RPV model. The aim is to make the appraisal process even more predictive, efficient and aligned with the new requirements of the credit market.

3. The valuer's perspective: the next challenge is expertise

During the E-Valuations conference in Mantua, it became clear that Property Value is a burning issue for Italian and European property valuers. Yet although the "what" and "why" of Property Value have been clarified, the real question for professionals is still "So how do I prepare?".

There is no magic formula, just strategic investment in one's own valuation skills.

The new paradigm requires a structural update of professional know-how, since:

"The role of the valuer is evolving – from simple technical executor to strategic property risk consultant."

- **The EU is setting the rules** – CRR and EVS 2025 define a common binding framework that ensures competitive equality between professionals from different Member States.
- **Adaptation to national markets is essential** – models must take account of local specificities and real estate segments.
- **The residential sector is crucial, systemic** – housing and mortgages directly affect the real economy.
- **The role of the valuer is evolving** – from simple technical executor to strategic property risk consultant.

In Mantua, various contributions anticipated this debate: the **Codice delle Valutazioni Immobiliari**, Tecnoborsa's Italian property valuation standard, the **ABI Guidelines** for the credit sector, **Assoimmobiliare's Quaderno 22** and – specifically for the agricultural sector – the publication by **CONAF** (National Association of Agronomists and Forestry Experts, member of TEGOVA) introducing the concept of **Agricultural Property Value**.

These publications all point to a cultural shift: Property Value is not only a technical parameter, but a professional paradigm that is reshaping the modern-day role of the valuer.

CONAF's contribution to Agricultural Property Value

The future of the valuation profession rides on the acquisition of interdisciplinary skills:

- **appraisal know-how, econometrics and statistics**, understanding and applying predictive models such as ARIMA and justifying the sustainability of the value over time;
- **multifactor risk assessment**, combining data from different sources (seismic, hydrogeological, energy and transition-related) and translating them into prudential decisions;
- **technological literacy**, using digital and algorithmic tools that enhance professional judgment without replacing it.

The real challenge for Property Value is training: valuers who can stay up to date will cement their position as key figures in the European valuation and lending system, contributing to market stability, transparency and investor confidence.

Conclusion – Towards a common language for Property Value in Europe

The development of Property Value heralds a new era for European valuation: a shared technical language based on prudence, transparency and comparability.

Across the Union, valuers must now pursue a common goal: to develop harmonised knowledge and practice so that Property Value can be a source of reassurance for banks, supervisory authorities and the public.

Methodological convergence between European professionals is not just a regulatory objective, it's a cultural imperative that TEGOVA is pursuing in order to transform valuation from simple measurement into a tool for the stability and sustainability of the entire real estate economy.

Author biographies: See Editor's note, page 35

#04

Modelling changes in the market value of real property over the course of its life cycle

Iryna Ivanova,
Oleksandr Drapikovskyi

Abstract

This paper considers the prerequisites for apportioning the market value of real property between land and land improvements; it outlines the principles underlying the distribution of market value and the calculation of land improvement depreciation; and it proposes a model for market value changes over the life cycle of real property and presents the results of its application.

All aspects of the property sector now form part of the EU Taxonomy, with the associated reporting requirements for publicly listed and large companies.

From 2024, European banks, insurance companies and other financial institutions are required to report on how they comply with the EU Taxonomy, using sector-specific key performance indicators (KPIs) to publish their sustainability indicators.

Banks and real estate investors believe that buildings aligned with the EU Taxonomy should be valued higher than those that are not. This value can be defined as a sustainability ratio.

Keywords: real property, land, land improvements, asymmetry of distribution, binary opposition, componentisation, land leverage.

Introduction

The effectiveness of any valuation depends on understanding the nature of the valued asset, especially if its nature is complex. This is the case with real property, which comprises disparate physical components – land and land improvements – the combination of which allows real property to be used for its intended purpose in a specific location for a certain time.

Real property is presented on the market as a whole asset, and it is this whole asset (not its individual physical components) to which the market value of real estate relates.

It is well established that market value reflects the usefulness of an asset as at the valuation date. In purchasing a specific asset, however, its owner or user determines its future – not only in terms of the benefits and privileges they can derive from this asset, but also in terms of their obligations to maintain it and sometimes even liquidate it, which have a fully defined value expression: the change in the value of real property over the course of its life cycle.

This change in the market value of real property is of particular importance when considering valuation issues relating to ESG factors and the reliability of loan collateral.

It should be noted that the market value of real property changes over the long term not only due to market volatility, but also because the physical components of the asset respond unevenly to the passage of time. This makes it necessary to apportion market value between land and land improvements and to further apportion the value of the latter among its various components. Such apportionment is not related to value depreciation under International Financial Reporting Standards, but is necessary to objectively (accurately) calculate changes in the market value of real property, using terms defined in valuation standards rather than accounting standards.

“ … the market value of real property changes over the long term not only due to market volatility, but also because the physical components of the asset respond unevenly to the passage of time. This makes it necessary to apportion market value between land and land improvements and to further apportion the value of the latter among its various components.”

1. The asymmetric distribution of real property's market value among its physical components

The solution to the problem of distributing market value is based on the economic principles of residual productivity, contribution and proportionality, which define three possible approaches to such distribution [**1**, p. 4.5]:

1. calculating the value of unimproved land based on comparable market data and/or the residual method, and then deducting this land value from the value of the real property to obtain the value of the land improvements;

2. calculating the value of buildings and other land improvements based on the residual replacement cost as at the relevant date and deducting it from the value of the real property to obtain the value of the land;

3. calculating the value of unimproved land and the value of land improvements, and then combining these two component values to determine the typical proportions of land and land improvements in the value of a specific type of real property.

That being said, generally accepted valuation standards [**1**, p. 4.4; **2**, p. G12; **3**, p. 27] set certain limitations on the direct application of these approaches to the distribution of market value.

For example, the first two approaches fall under the fractional concept of valuation, where we first calculate the portion of a property's value attached to one of its components, and then automatically assign the remaining value to the other component. The valuation risk inherent in this concept is that an error in determining the value of one component, such as an overvaluation of land or land improvements, deprives another component of its "corrective" value.

Meanwhile, a distribution approach based on the proportionate value of land and improvements requires a preliminary study to establish: (a) the share of land in the market value of the real property depending on its location and; (b) the extent of depreciation of land improvements based on their level of upkeep, technical maintenance, and timely replacement of structural elements and equipment. Typically, statistical (hedonic) modelling is used to determine the "marginal contribution" of attributes inherent in the physical components of real property. However, any percentage applied to land and land improvements will not be fixed and will change over time as the improvements age and approach the end of their economic life.

Moreover, it is understood that land acquires value at the property development stage, when the function and intensity of land use are formed, and this value is then only maintained over the economic life of the land improvements. However, the value of land improvements arises only upon completion of the property development and typically declines over time, thereby determining the operational lifespan of a particular real property.

We should point out that at the development stage, land improvements are characterised not by their value, but by the costs incurred in their creation, including financial expenditure and the developer's profit. Moreover, the value of land improvements in "detached" form – due to the cost of financing and the developer's profit – implicitly includes the value of the land.

This highlights the asymmetric distribution of real property value among its physical components. The value of the land is residual, in line with the principle of residual productivity, while the value of land improvements is contributive, and defined by the difference between the current value of the improved property and the market value of the land (the contribution principle).

Thus, the asymmetry inherent in distribution requires a certain consistency in determining the value of the physical components of real property, according to which:

- first, the market value of the land is calculated based on market comparison and/or the residual method;
- and then the value of land improvements is calculated, using the indirect comparison and residual capitalisation methods (extraction method, income distribution method, allocation method), which allow us to take their actual condition into account.

2. Time and cost parameters of the condition of land improvements

Clearly, the actual condition of land improvements will reflect the degree of their depreciation as at the valuation date, and can be characterised in both time and cost terms.

Time parameters include the useful life of land improvements, their age and remaining life:

Useful life of land improvements =
age of land improvements as at valuation date + remaining life of land improvements

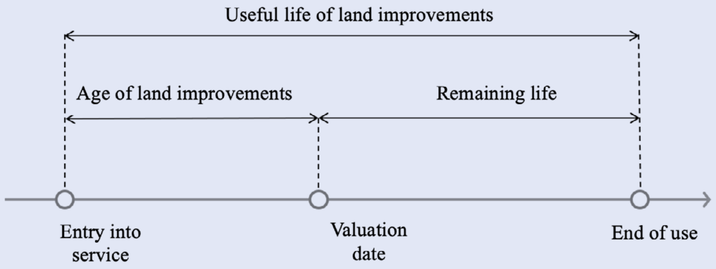


Fig. 1 Time parameters of land improvement condition

Cost parameters include replacement or reproduction cost and depreciation:

Replacement (reproduction) cost of land improvements =
value of land improvements as at valuation date + depreciation

Replacement cost of land improvements

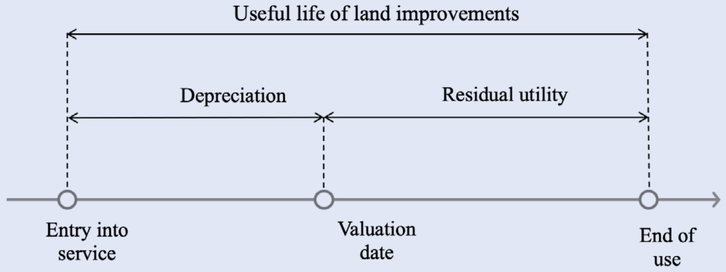


Fig. 2. Cost parameters of the condition of land improvements

The key parameter among these is the cost of replacing land improvements with a modern equivalent [**4**, p. A10.05; **5**, p. 8.1, 8.23; **6**, p. 9.7], reflecting their expected future utility. During the useful life of the land improvements, this parameter simultaneously indicates both the loss of utility of these improvements over their operation and their remaining utility. That being said, the cost of replacing land improvements with a modern equivalent is based on the costs of creating them in accordance with current technical standards, construction technologies and requirements for materials, energy saving, environmental and social safety as at the valuation date, reflecting changes in market priorities.

The cost of replacing land improvements with a modern equivalent will be equal to the difference between the gross development cost, which by definition is the market value of the property before depreciation [**5**, p. 9; **7**, p. 100], and the market value of the land. On the one hand, this makes it possible to calculate the replacement cost of land improvements based on market evidence, and on the other, it explains why the cost of replacing land improvements, in addition to construction costs, should include financial costs, developer profits and other costs that a market participant could incur when creating a modern equivalent asset [**8**, p. 90.05].

The value of land improvements is calculated in a similar manner throughout their useful life, i.e. as at the valuation date, which is different from the date a building was put into operation. However, the market value of the real property will already reflect the cumulative depreciation of the land improvements.

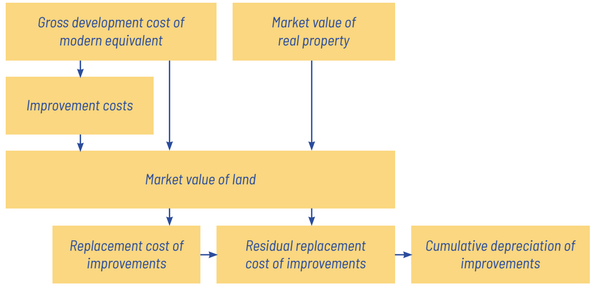


Fig. 3 Basic cost factors that characterise the condition of land improvements

Thus, the depreciation of land improvements d can be calculated:

either as the inverse of the ratio of the actual age of land improvements EA to the expected useful life of the land improvements PL as at the valuation date:

$$d = 1 - \frac{EA}{PL} \qquad (1)$$

or as the inverse of the ratio of the value of land improvements at k-th age V_B^k, which reflects the residual utility of land improvements, to the cost of replacing land improvements with a modern equivalent V_B^{RC}, which reflects their expected utility, as at the valuation date:

$$d = 1 - \frac{V_B^k}{V_B^{RC}} \qquad (2)$$

It is believed that the loss of utility of land improvements as at the valuation date cannot exceed 80%, at which point they become unsuitable and unsafe for further use [**9**, p. 5].

The depreciation of land improvements will largely depend on the composition of their components. Each component has an associated cost and useful life, and either will or will not require timely replacement or renewal. Such componentisation is necessary for a more objective (accurate) calculation of land improvement depreciation.

In general, the empirically derived curve for changes in the value of land improvements is non-linear, reflecting an accelerated rate of depreciation in the early years of their life compared to later years, when land improvements may have a slower rate of depreciation.

In this case, two extreme options for changes in the value of land improvements can be considered:

- first, where for each land improvement component, the useful life and degree of depreciation are taken into account, assuming proper technical maintenance and timely replacement/renewal once 80% depreciation is reached;
- second, where all requirements of the standard technical maintenance programme and timely replacement/renewal of components are ignored.

To illustrate the consequences of implementing these options, we can consider the change in the cost of land improvements to a multi-apartment residential property (Fig. 4). As we can see, the first option ensures the beneficial use of the housing throughout the entire life of the land improvements, whereas the second option reduces beneficial use almost by half.

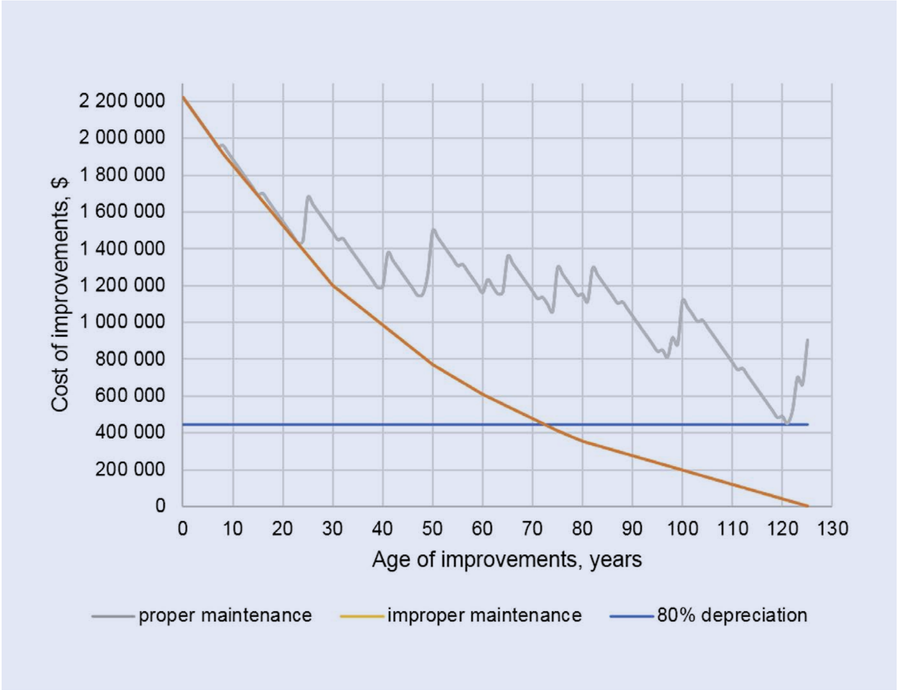


Fig. 4 Change in the value of improvements due to obsolescence under different maintenance conditions

3. Binary opposition: the relationship between cash flows at the development and operating stages of a real property

Of course, the value of real property will change not only as a result of the depreciation of land improvements, but also depending on the share of land in this value, which reflects the advantages/disadvantages of the property's location.

Given that the sum of the market value of the land V_L and the cost of replacing land improvements with a modern equivalent V_B^{RC} corresponds to the market value of the completed real estate development before the depreciation of land improvements, i.e. the gross cost of the development V_0^{GDV}:

$$V_0^{GDV} = V_L + V_B^{RC} \qquad (3)$$

the model for structuring the market value of real property V_0^m may be formalised as:

$$V_0^m = V_0^{GDV}.L + V_0^{GDV}.(1-L).(1-d) \qquad (4)$$

where L is the share of land in the gross development value.

$$V_0^m = V_0^{GDV}(L + (1-L).(1-d)). \qquad (5)$$

Thus, there is a binary opposition where the valuation models at the development and operational stages are related to the same asset – a fully developed real property – the market value of which is the gross development cost. This allows us to describe the extent to which the market value of a real property changes depending on its location and the degree of land improvement depreciation:

$$k_s = L + (1-L).(1-d). \qquad (6)$$

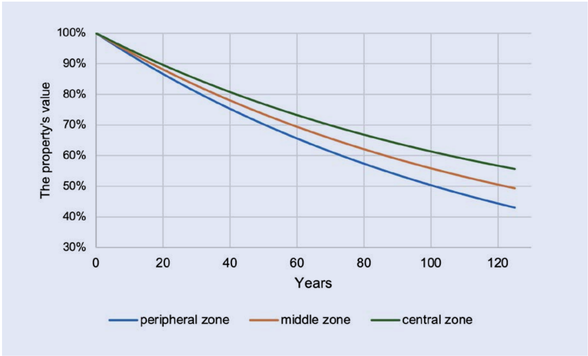


Fig. 5 Change in the market value of real property depending on its location within a populated area and the degree of land improvement depreciation

Obviously, the market value of real property in the central area of a large city will decrease more slowly than on its periphery, since it is "supported" by a larger share of land in the total value, i.e. there is land leverage [10; 11]. The higher cost of land in central areas compared to other areas of a city is due to high demand for a favourable location amidst limited supply.

Thus, market value will depend both on changes in the market situation and on the actual depreciation of land improvements, taking into account the different useful lives of their components, proper technical maintenance and timely replacement, as a result of which the shares of land and land improvements as at the revaluation date may differ substantially from the original proportion in the property's value.

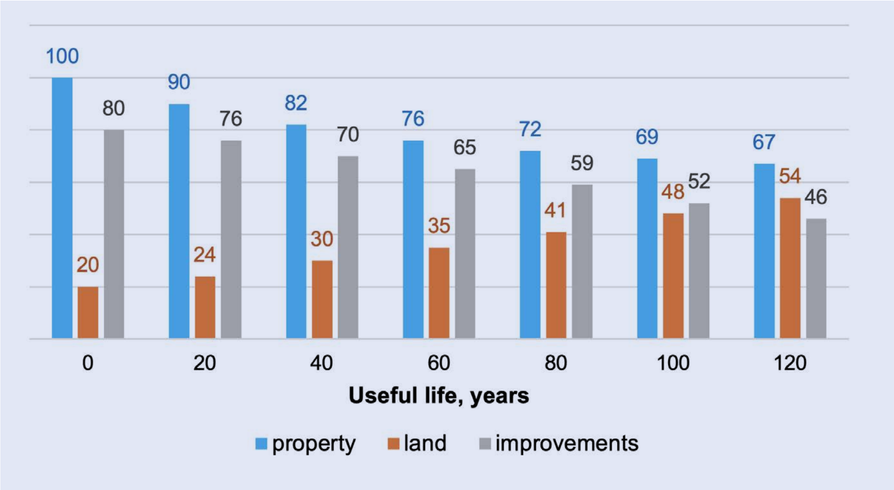


Fig. 6 Change in property value and the share of physical components in this value, assuming an increase in land value and an exponential model of depreciation of land improvements

The transformation of the original proportion of the value of physical components is also due to the fact that each is affected by different factors, potentially resulting in different rates of change in their value. Therefore, taking into account differences in the trajectories of land and improvements values can help explain how real property prices change over time.

Conclusion

Current socio-economic and regulatory trends in the property market require valuers to reconsider how they measure the usefulness of an appraised property over its long-term maintenance. In this regard, market value should be considered from the perspective of its change over the property life cycle.

This perspective on measuring utility will certainly be useful when addressing sustainable development issues (energy efficiency, green construction, environmental impact) and when analysing the reliability of loan collateral. In such cases, it is necessary to take into account not only the initial costs of acquiring/creating a property, but also the subsequent costs associated with its maintenance and disposal.

Analysing these costs requires the real property's market value to be structured according to its physical components, providing a basis for comparing properties with different locations and conditions of improvements.

The practical implementation of such structuring involves: taking into account the asymmetric distribution of value between the physical components of the property; moving beyond simplified models for calculating the depreciation of improvements; and establishing the relationship between cash flows at the development and operational stages of the property based on the principle of binary opposition. This enables us to determine the extent of change in the property's market value depending on its location and the degree of depreciation of improvements in the long term.

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Iryna Ivanova REV is Chairman of the Board of the Ukrainian Society of Appraisers.

#05 A valuation manager's journey: Leading health care real estate valuation across Europe

Valérie Berlier

I oversee a portfolio exceeding €6 billion, with a strong focus on healthcare real estate. Behind those numbers lies a story of people, processes, and the constant pursuit of trust and transparency.

The human side of valuation

Often seen as a technical discipline, valuation is in practice deeply human. My role involves coordinating with 15 external valuers, each bringing their own perspective, methodology, and cultural context. Orchestrating quarterly valuations across nine countries is a logistical marathon, but also an exercise in relationship-building. Clear communication, respect for local expertise, and the ability to bridge language and cultural differences are as important as the spreadsheets and models.

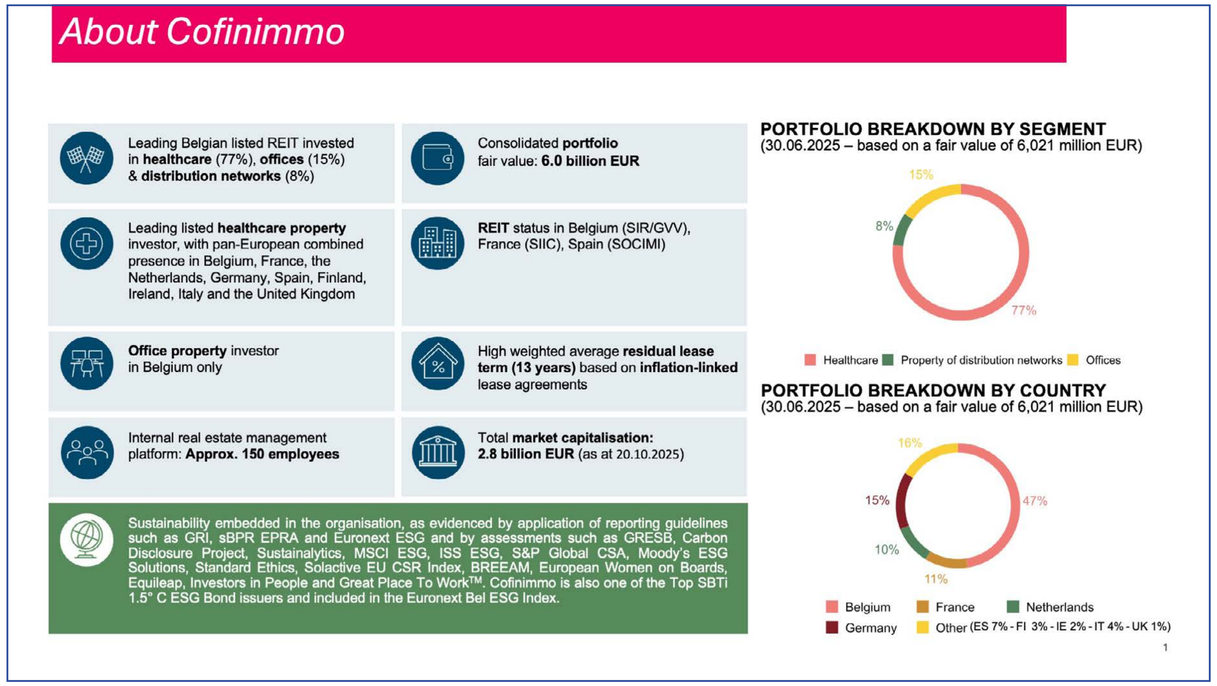
I see myself as a conductor of an orchestra, each valuer plays their part, but it is my responsibility to harmonise the performance so that the final result is consistent, credible, and aligned with both local realities and international standards.

Navigating complexity

Europe is a patchwork of regulatory frameworks. Each country has its own rules for REIT regimes, tax treatment, transaction costs (e.g. real estate transfer tax (RETT) deduction is standardised in Belgium at 2.5% for valuation of assets > €2.5M). My challenge is to navigate these differences while ensuring compliance with EU law[1]. This requires constant vigilance and collaboration with local experts as well as creativity. Valuation is not about applying a single formula; it's about adapting intelligently to diverse contexts while maintaining comparability.

"Valuation is not about applying a single formula; it's about adapting intelligently to diverse contexts while maintaining comparability."

[1] Green Deal, EED (Energy Efficiency Directive), EPBD (Energy Performance of Buildings Directive), CSRD (Corporate Sustainability Reporting Directive), and EU Taxonomy introduce sustainability obligations that vary in implementation.



In pan-European real estate valuation, there is no one-size fits all approach: each country and often each market segment favours different methodologies based on its regulatory, economic, and cultural context. For example, in France, the income capitalisation method remains a benchmark for healthcare assets, as it relies on the stability of long-term leases and predictable rental flows. In contrast, in Germany and the Netherlands, valuers frequently use the Discounted Cash Flow (DCF) method, which allows for a more detailed modelling of rent evolution, occupancy rates, and CAPEX over the business plan horizon. In active markets, the direct comparison ("market approach") is often used for newer assets, provided the market is sufficiently liquid and transparent to offer relevant comparables.

These methodological choices reflect both the expectations of local investors and regulators and the maturity and transparency of each market. It is common practice to either combine several valuation methods taking the arithmetic mean of their results as the Market Fair Value or to apply a secondary method as a cross-check, in order to justify or challenge the outcome produced by the primary approach.

This methodological flexibility is essential to ensure both the relevance and comparability of values, while respecting international standards (EVS, RICS, IVS).

Another layer of complexity comes from economic volatility and diverging inflation trajectories that complicate yield calibration even across the Eurozone. Anticipating these shifts and adjusting assumptions is part of the craft. Yet beyond the numbers, the real challenge lies in data quality and market transparency. Some markets are open and fluid; others are opaque. My role is to challenge assumptions, question data, and ensure that our valuations stand up to scrutiny.

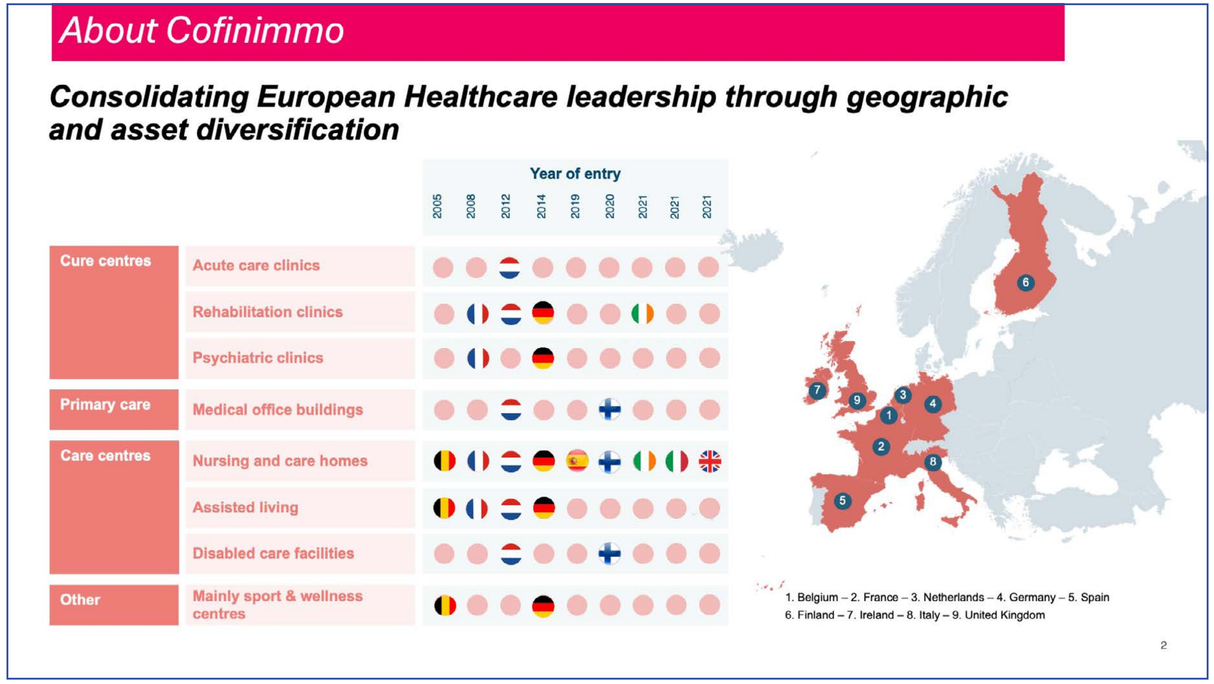
Cofinimmo's expertise in healthcare real estate

Cofinimmo has built a reputation as a leader in healthcare real estate, a specialisation that brings unique valuation challenges. Unlike traditional office or retail tenants, our tenants are operators: healthcare providers who run care centres (as nursing homes, assisted living, disabled care), and/or cure centres (as rehabilitation centres, clinics).

Their business models vary significantly across countries, shaped by local regulations, cultural expectations, and the structure of national healthcare systems:

- Revenue Sources: Operators draw income from a mix of private payments, insurance reimbursements, and public subsidies. The balance of these sources differs from one country to another, making it essential to understand the local ecosystem.
- Reliance on Social Security Systems: In many markets, operators depend heavily on the local public social security system, which may or may not provide subsidies. This reliance introduces both stability and risk, depending on the strength and sustainability of the system.
- In healthcare real estate, the Estimated Rental Value (ERV) or the Market Fair Value is usually measured per bed rather than per square meter. This reflects the operational nature of the asset, where the property's value is tied directly to its capacity to deliver care.
- A critical aspect of valuation is assessing whether a property can be "recycled" either for use by another operator or for a complete redevelopment should the current tenant default or after the lease term. This requires a forward-looking perspective: is the building adaptable, compliant with healthcare standards, and attractive to alternative operators or for another kind of use?

These factors make healthcare valuation both complex and fascinating. It is not enough to assess bricks and mortar. We must understand the operator's business model, the regulatory environment, and the resilience of the property in the face of change.



"In healthcare real estate, the Estimated Rental Value (ERV) or the Market Fair Value is usually measured per bed rather than per square meter. This reflects the operational nature of the asset, where the property's value is tied directly to its capacity to deliver care."

Bringing ESG into the equation

Sustainability is no longer a side note; it is central to how investors and regulators assess real estate. At Cofinimmo, we work closely with our Sustainability team and external valuers to embed climate risks, energy performance, and social impact in our models.

In healthcare, the 'S' in ESG valuation is closely linked to "care", but it also encompasses broader social dimensions. Social impact factors are embedded within valuation assumptions and may be reflected, for example, in lower risk premiums, higher occupancy rates, or reduced obsolescence risk for assets with strong social credentials.

We see more and more valuation teams collecting both quantitative and qualitative social impact data, such as :

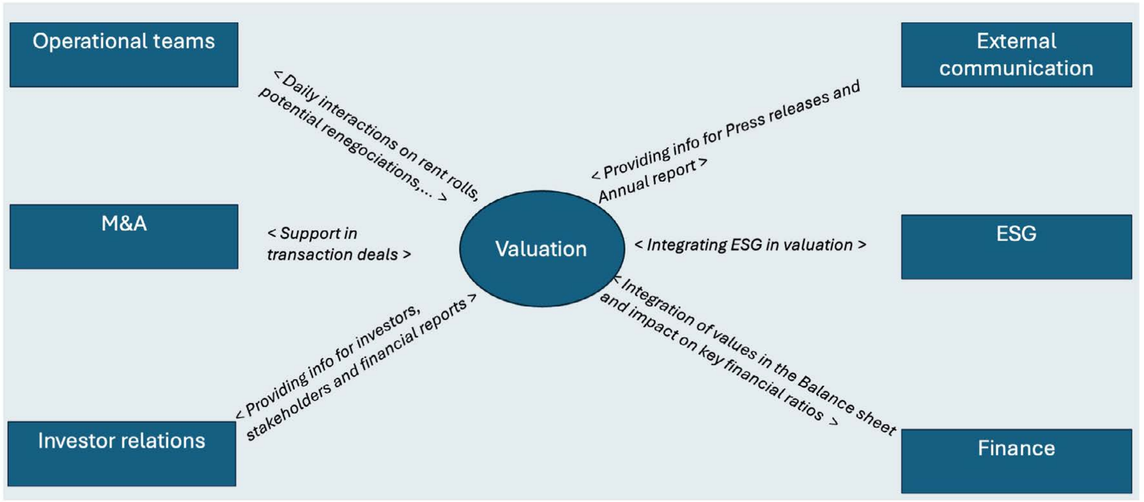
- Whether satisfaction surveys are conducted among residents and staff
- The distance to public transport
- The presence of facilities that encourage green modes of transport (e.g. secure bicycle parking, showers, changing rooms, lockers, EV charging stations, etc.)
- Air quality monitoring within the building
- Ancillary amenities for residents, staff and visitors (e.g. gym, wellness areas, cafés, canteen, nursery, medical centre, etc.)

ESG is not just about compliance. It is about shaping the future of real estate. ESG credentials increasingly influence cap rates (be it with a green premium or brown discount), rental premiums and investor confidence. By integrating these factors, we are not only valuing buildings, we are valuing their resilience, their contribution to society, and their role in a sustainable future.

"ESG is not just about compliance. It is about shaping the future of real estate."

Why valuation matters for Cofinimmo

Valuation is the hub connecting strategic, financial, and operational decisions.



Opportunities for the profession

The profession itself is evolving. The Recognised European Valuer (REV) accreditation has become a symbol of competence and credibility across borders. Meanwhile, EVS 2025, now the paramount reference standards for banks in the Eurozone, is a milestone for consistency and transparency. These developments strengthen trust in valuations and open doors for mobility and recognition across Europe.

For me, these changes are more than technical updates, they are opportunities. They allow us to differentiate ourselves, to embrace digital transformation, and to position valuation as a cornerstone of sustainable investment.

A daily mission

At the end of the day, my mission is simple yet demanding: to ensure that our valuations are robust, transparent, and trusted.

Valuation is not just about numbers, it is about people, trust, and the future of our profession. Every day, I see the opportunity to drive innovation, foster credibility and contribute to the evolution of real estate valuation in Europe.

Valérie Berlier REV is Valuation Manager at Cofinimmo.

#06

Navigating ESG valuation (II) – The evolving paradigm: From energy performance to holistic ESG valuation and the imperative for harmonisation

Jolanta Panas

Abstract

The first article in this series examined how valuers can navigate the ESG data landscape and begin adapting traditional models to a changing regulatory environment. This second article moves from awareness to application. It explores the shift from an energy-centred perspective towards a holistic Environmental, Social and Governance (ESG) valuation paradigm and considers how this evolution affects day-to-day valuation practice.

The discussion is set against the backdrop of Europe's evolving sustainable-finance framework, including the EU Taxonomy, EPBD and CSRD/ESRS, as well as the recent Omnibus initiative, which aims to streamline reporting obligations and will reduce the overall volume of sustainability disclosures available to market participants. Prudential expectations placed on banks further shape how ESG considerations enter collateral valuation, often through energy and environmental indicators.

Within this context, the article analyses the persistent lack of full convergence between EVS, IVS and the RICS Red Book and shows how **the ESG-REV Matrix, understood as an ESG Matrix for Real Estate Valuation**, can support valuers by offering a transparent procedural workflow. The Matrix is distinct yet complementary: IVS emphasise materiality, data quality and disclosure, whereas ESG-REV operationalises these principles through structured identification, verification, interpretation and reporting within a Risk–Cash Flow–Value (R–CF–V) logic. The central conclusion is that ESG-driven transformation should be seen not as a cost but as an investment in resilience, requiring clearer procedures, stronger documentation and realistic recognition of the workload placed on valuers.

Keywords: ESG integration, real estate valuation, EU Taxonomy, ESG-REV Matrix, valuation standards, CRREM, CVaR

1. Picking up the thread: from the data maze to a new valuation paradigm

In the first article of this series in the European Valuer Journal (No 36, July 2025), ESG was considered primarily through the lens of data. The focus was on where information comes from, how reliable it is, and how far traditional valuation models can be adapted without distorting the Market Value concept. For many assignments, simply obtaining robust energy and emissions data already felt like a victory.

The institutional environment has moved further in a short period. The European Green Deal, the EU Taxonomy Regulation, the recast Energy Performance of Buildings Directive (EPBD), the Corporate Sustainability Reporting Directive (CSRD) and the European Sustainability Reporting Standards (ESRS) together make clear that ESG is no longer a specialist topic or a niche client request [1–3]. It is becoming part of the normal due diligence expected by lenders, investors, auditors and supervisors. At the same time, supervisors such as the European Central Bank (ECB) and the European Banking Authority (EBA) expect banks to integrate climate related and environmental risks into their strategies, governance, risk management and internal capital processes [4,5]. As a result, ESG is now anchored in credit risk and portfolio risk, not only in corporate communication.

A further development in 2025 has been the Commission's simplification package, often referred to as the Omnibus initiative. By narrowing the scope of entities required to report and postponing the reporting obligations for subsequent waves, the initiative will reduce the volume of sustainability disclosures available to the market. For valuers, this means that ESG information may remain concentrated among larger corporates, while smaller owners and borrowers provide less standardised data, reinforcing the importance of clear evidence hierarchies and transparent verification.

Professional standards have evolved in parallel. The 2025 editions of the International Valuation Standards (IVS), the European Valuation Standards (EVS) and the RICS Valuation Global Standards (the RICS Red Book) all recognise that Environmental, Social and Governance (ESG) factors must be considered where they are material to market participants and capable of influencing value. The environmental component remains predominant, both because the built environment contributes significantly to climate and resource degradation, and because most regulatory and banking frameworks currently focus on energy efficiency and climate risk. Social and governance aspects are acknowledged in principle, but still lack consistent indicators and market evidence. Their consideration at this stage involves recognising possible relevance rather than quantifying impact. ESG does not replace traditional valuation procedures, but broadens the professional lens through which valuers identify, verify and document features that may contribute to value formation or uncertainty.

Within this context, **the ESG-REV Matrix (ESG Matrix for Real Estate Valuation)**, developed from research on the institutional determinants of property valuation and formulated in the author's PhD thesis defended in December 2024 at the Warsaw School of Economics, offers a practical way to translate this new regulatory and market reality into day-to-day valuation work. The Matrix does not seek to redefine bases of value, introduce scoring mechanisms or replace professional judgement. Instead, it provides a structured procedural framework that organises how valuers identify ESG related evidence, verify its credibility and interpret its relevance within the valuation process. In its present formulation, the ESG-REV Matrix operationalises ESG considerations through a Risk–Cash Flow–Value logic.

This article therefore moves from the question "What ESG data do we have?" towards the question "How do we use ESG to frame valuation in a more holistic and harmonised way?" It does so while acknowledging that, in many regulatory contexts, ESG in practice still means the environmental component, and that valuers must reconcile this narrow emphasis with the broader ESG reality observed in markets and portfolios.

A central theme announced in the abstract to the second article was the gradual transition from an energy centred perspective towards a holistic understanding of ESG. This shift does not imply equal weighting of the environmental, social and governance dimensions, particularly in the building sector where environmental impacts remain structurally dominant. Rather, it acknowledges that social and governance considerations frame demand stability, data credibility and institutional expectations and therefore form part of the broader context within which valuers interpret risk and uncertainty.

2. From energy labels to holistic ESG performance

For more than a decade, the ESG conversation in valuation has been dominated by energy performance. Energy Performance Certificates (EPCs), heating and cooling demand, insulation levels and, more recently, operational carbon intensity have acted as the main gateways through which sustainability entered valuation files. This was understandable. Energy data were and remain the most widely regulated and relatively standardised environmental metrics in the built environment. They are also the primary channel through which EU regulation and banking supervision operationalise ESG in mortgage and collateral risk reporting.

However, the way the EU Taxonomy for Sustainable Activities defines environmentally sustainable economic activities shows that, even within the environmental pillar, the scope extends far beyond energy. It includes water use, circularity, pollution and biodiversity protection, among other aspects. The Taxonomy's technical screening criteria for construction and real estate activities require not only energy and emissions performance but also conditions on construction waste, materials and climate risk resilience [1].

The ESG-REV Matrix reflects this broader environmental scope. Within its Environmental pillar it distinguishes indicators related to energy and emissions, climate physical and transition risks, water management, waste, circularity and biodiversity. Each of these is linked explicitly to potential channels of impact on risk, cash flows and value. A Carbon Risk Real Estate Monitor (CRREM) pathway indicating a misalignment year in 2032, for example, highlights when regulatory and transition risks are expected to crystallise. This can then be used to structure discussion of retrofit timing, capital expenditure (CAPEX) and potential vacancy during works, rather than to apply an arbitrary percentage "green discount" or "brown penalty" [6].

The key shift for valuers is to stop treating energy as the whole story and instead see it as one part of a wider environmental risk and performance profile. A logistics asset with moderate energy performance but real exposure to flooding or heat stress may face very different future costs and income risks from an urban office with a higher EPC rating but low physical risk. Similarly, assets that appear aligned on energy metrics but are exposed to future carbon price shocks or local pollution constraints may carry transition risk that is not obvious from the EPC alone.

"... a further element that increasingly shapes institutional risk is the risk of greenwashing embedded in lease clauses."

The Social dimension is less codified by regulation but increasingly visible in market practice. Research on workplace health and well-being, and frameworks built around competencies for healthy workplaces, show how factors such as indoor air quality, acoustic comfort, daylight, access to green space and psychological safety affect user satisfaction and productivity [7, 15-16]. For valuers, these factors rarely translate into neat numerical premiums, but they do affect tenant retention, achievable lease lengths and the depth of demand in specific occupational segments. In the ESG-REV Matrix this type of evidence is channelled primarily through cash flows. More attractive, healthier buildings tend to show lower void risk and more stable rents, especially where corporate occupiers have their own ESG reporting obligations and internal workplace standards.

Within this broader governance context, a further element that increasingly shapes institutional risk is the risk of greenwashing embedded in lease clauses. In practice, many provisions labelled as "green" or "sustainability-oriented" rely on vague commitments, non-verifiable declarations or general ecological claims that lack measurable performance criteria, independent verification or a clear allocation of responsibilities. Such clauses may create the appearance of alignment with ESG objectives without ensuring that the underlying actions are concrete or enforceable. As a result, they expose owners, tenants and lenders to compliance and reputational risk, particularly in light of the emerging EU framework on sustainability claims [10].

In the ESG-REV Matrix, this risk falls squarely within the governance pillar: it affects the reliability of information, the credibility of transformation plans and the extent to which contractual arrangements offer a defensible basis for risk assessments and cash-flow assumptions in valuation. This highlights the need for a regulatory framework that clearly defines what constitutes a "green lease", ensuring that the term reflects consistent, measurable and verifiable conditions for all market participants. From a real estate perspective, such a definition would likely need to rely on the most stringent criteria, for example, a pathway aligned with genuine net-zero performance supported by transparent, auditable commitments by both landlords and tenants.

Taken together, these three pillars move the analysis from "What is the EPC rating?" to "What is the overall ESG resilience profile of this asset, and how does that profile influence risk exposure, cash flow stability and long-term value?" The ESG-REV Matrix gives valuers a way to answer this question procedurally rather than intuitively, while still acknowledging that, under current EU law and supervisory practice, much of the formal reporting pressure continues to revolve around energy and emissions and climate risk.

3. The regulatory imperative: EU Taxonomy and beyond

The EU Taxonomy for Sustainable Activities has become the symbol of Europe's sustainable finance architecture. While most valuers are aware of its existence, its practical implications for valuation assignments are less well understood.

The Taxonomy is, at heart, a classification tool. It defines when an economic activity can be called "environmentally sustainable" based on three main tests. These are:

1. substantial contribution to one of six environmental objectives
2. "do no significant harm" to the others; and
3. respect for minimum social safeguards [1]

For real estate, the relevant economic activities include new construction, renovation and the acquisition and ownership of buildings.

Valuers are not responsible for labelling activities as 'Taxonomy aligned'. That is a disclosure obligation for companies and financial institutions under the CSRD and related regulations. For financial market participants, Taxonomy-related disclosures are also required under the Sustainable Finance Disclosure Regulation (SFDR), but these obligations relate to financial products rather than individual property valuations [11]. However, valuation cannot remain disconnected from this classification logic.

First, Taxonomy alignment or misalignment can change the pool of potential buyers and lenders. Assets that help financial institutions meet their own sustainable finance targets may enjoy better access to capital or more favourable lending terms, not because of general enthusiasm for "green" assets, but because they reduce regulatory and reputational risk for lenders and investors. This can influence yields and pricing in segments where sustainable finance has become mainstream.

Second, the "do no significant harm" (DNSH) criteria and minimum safeguards draw attention to aspects such as water efficiency, pollution control and worker health and safety, which are particularly relevant for assets under construction or renovation, but increasingly inform broader risk assessment frameworks. Even if these criteria do not directly apply to existing buildings in a valuation context, they signal areas where future regulatory tightening may create additional compliance obligations or operational risks. A building that fails DNSH criteria may face future compliance costs, legal challenges or reputational pressure. These effects feed into the risk and cash flow channels of valuation reasoning even if today's rent roll looks robust.

Within the present regulatory architecture, environmental indicators dominate because EU legislation has developed detailed frameworks for energy performance, emissions trajectories and renovation pathways. This reflects the structural reality that the building sector has the most significant impact on climate and resource use. Social and governance elements appear mainly through horizontal obligations on disclosure, risk management, minimum safeguards and responsible business conduct. For valuers this asymmetry does not diminish their relevance. Instead, it requires an ability to recognise where gaps in social information or weaknesses in governance practices may increase valuation uncertainty, even if these factors do not yet lead to numerical adjustments.

"... lenders expect a transparent explanation of how climate and other ESG risks have been considered, even where these do not yet change the numerical value reported under Market Value or Property Value."

The regulatory imperative therefore reinforces the primacy of environmental considerations while indicating that S and G form part of the wider institutional and informational context within which valuation takes place. A valuation logic that acknowledges this broader context does not treat S and G as direct determinants of value, but as elements that help to frame the credibility of evidence and the confidence attached to forward looking assumptions. The holistic paradigm thus reflects both the widening range of ESG themes and the sustainability oriented regulatory environment in which valuers identify, verify and interpret information.

Third, the growing integration of sustainability into banking regulation means that ESG has become a credit-risk consideration rather than a marketing theme. Under the Capital Requirements Regulation and supervisory guidance issued by the EBA and the ECB, banks are required to identify and manage environmental, social and governance risks across their portfolios, including through collateral valuation and scenario analysis [4,5]. In this context, lenders increasingly rely not only on Market Value but also on the regulatory concept of Property Value, which is intended to reflect a prudent, long-term sustainable value rather than a point estimate at the top of a market cycle. For assets exposed to material ESG risks, this prudential perspective means that reasonably foreseeable regulatory costs, obsolescence and transformation measures may need to be reflected where they are supported by credible evidence, for example CRREM alignment analysis, national renovation trajectories or statutory retrofit benchmarks, while avoiding reliance on purely speculative future price appreciation. As a result, when valuers provide opinions for secured lending, lenders expect a transparent explanation of how climate and other ESG risks have been considered, even where these do not yet change the numerical value reported under Market Value or Property Value.

The Energy Performance of Buildings Directive occupies a particular place in this regulatory ecosystem. It sets minimum energy performance requirements and renovation objectives and also aims to increase the harmonisation of Energy Performance Certificate (EPC) systems by standardising methodologies, classes and data reporting formats [2]. The legal consequences attached to energy performance levels, including letting restrictions or mandatory renovation thresholds, are determined through domestic legislation in the Member States, reflecting national policy choices rather than direct obligations imposed by the Directive itself.

The latest version of the Directive mandates a step change to an energy-efficient and decarbonised building stock by 2030, 2033 and 2035 and requires national pathways for improving the worst-performing buildings [2]. In CRREM terminology, this evolution is often expressed through the year in which a building's emissions trajectory diverges from the relevant decarbonisation pathway (previously referred to as the 'stranding year', now termed the 'misalignment year') [6]. In the ESG-REV Matrix the same concept is retained, emphasising that what matters for valuation is the practical moment when regulatory and market expectations begin to diverge from the building's current performance.

From a valuation perspective, regulatory timelines and trajectories should therefore be treated as structured context within which CAPEX, income risk and value are interpreted, not as automatic triggers for pre-programmed value deductions. This is also where the absence of robust benchmarks creates practical friction. There is no European central database of typical retrofit measures and associated costs for different building typologies and regulatory pathways. As a result, valuers frequently encounter situations where the market expects them to "monetise retrofits" in the form of CAPEX profiles and downtime assumptions without providing a reliable empirical base for those numbers. A future European level repository of retrofit cost benchmarks for standardised sets of measures could significantly support this work, especially for smaller markets and individual valuers who cannot build their own evidence base.

In practice, this regulatory architecture means that ESG related questions appear in valuation assignments more often and in more formalised ways. At the same time, the tools used by banks for climate and transition risk, such as scenario analysis frameworks and portfolio level metrics, are increasingly sophisticated. The challenge for valuers is to remain connected to these tools, for example CRREM pathways or Carbon Value at Risk diagnostics, while staying within the discipline of Market Value and evidence-based reasoning.

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4. Fragmented guidance: EVS, IVS, RICS and what harmonisation really means

An analysis of the latest valuation standards editions for 2025, including European Valuation Standards (EVS), International Valuation Standards (IVS), and RICS standards, indicates an unprecedented convergence in recognising ESG factors, while maintaining distinct differences in emphasis and the degree of prescriptive guidance. The International Valuation Standards (IVS) remain principle-based and global in scope, requiring valuers to consider environmental, social, and governance factors in the valuation process where they are measurable and relevant. The new Appendix to IVS 104 on Environmental, Social and Governance Considerations emphasises the necessity of considering significant ESG factors that may impact value, yet deliberately avoids imposing rigid rules or numerical thresholds, focusing instead on materiality and transparency of disclosures [11].

The RICS standards (RICS Valuation – Global Standards), which adopt and apply the IVS, provide additional specific implementation guidance that places a distinct emphasis on proportionality and market evidence. While valuers are required to identify and report on significant ESG factors, the impact of these factors on value should only be reflected where there is observable market evidence or where, in the valuer's judgement, market participants would expressly reflect such matters in their bids. This serves as a clear warning against "leading the market" and artificially creating value based on sustainability goals that have not yet been reflected in transactional behaviour. RICS underscores that the valuer's role is to reflect the market, not to drive it, which aligns with the approach of most standard-setting bodies [13].

In contrast, the European Valuation Standards (EVS), particularly EVS 6 regarding valuation and energy efficiency, adopt a more prescriptive stance strictly linked to European Union regulations, such as the EPBD. EVS 6 establishes that a legal obligation to renovate a building to a higher energy performance standard by a fixed date or at a specific inflection point (e.g., sale or lease) creates an unavoidable, significant cost impacting Market Value. Valuers must be aware of these legal deadlines and estimate the cost of renovation required to meet compliance, treating it as a factor affecting the valuation, even if not all market participants fully price these costs in current bids [14]. This approach, stemming from a prudential and consumer protection perspective within the EU Green Deal framework, appears more stringent than the cautious, evidence-based emphasis of RICS and the high-level principles of IVS.

In this context, the proprietary ESG-REV matrix serves as a bridging tool that connects these varied approaches. Although a distinct instrument, it complementarily supports the requirements of the standards. While IVS recommends considering ESG where relevant, emphasising data quality and transparency, the ESG-REV matrix operationalises these guidelines by providing valuers with a structured tool for collecting unified and standardised data. It allows for documenting the impact of ESG factors on three key valuation elements: Risk (R), Cash Flow (CF), and Value (V). This enables valuers to meet the requirements of EVS 6 by identifying legally required renovation works and estimating capital expenditure (CAPEX), while utilising the matrix structure to demonstrate how these actions influence the property's risk profile and cash flows.

The application of the ESG-REV matrix also facilitates compliance with RICS and IVS requirements by clearly separating what is observable in current market behaviour from elements resulting from prudential regulations or scenario analyses. The matrix allows for the transparent documentation of which indices influence specific parts of the valuation reasoning, which is crucial in the face of growing pressure to avoid greenwashing and move towards a "fact-based" rather than "suggestion-based" stance. Harmonisation in this sense does not imply forcing all standards to use identical wording, but rather equipping valuers with a procedural language and audit trail that allows mapping different regulatory pressures onto a consistent internal valuation narrative. The ESG-REV matrix, as a pioneering proposal capable of forming part of the valuation report, paves the way for a functional harmonisation of valuation practice, even amidst formal differences between EVS, IVS, and RICS standards.

5. What changes in the valuation workflow?

For practitioners the most important question is not whether ESG is conceptually important, but what it changes in the everyday steps of valuation. The ESG-REV Matrix translates the growing regulatory and standard setting expectations into four operational stages that align with IVS and EVS structures. These stages are Identification, Investigation and Verification, Interpretation and Disclosure.

At the instruction stage, valuers need to agree with the client whether ESG is likely to be material, given the asset type, location, holding strategy and intended use of the valuation. Even where the client does not explicitly request an ESG focused assignment, if the property is used as collateral for bank lending, subject to public reporting under the CSRD, or located in a jurisdiction with ambitious renovation requirements, ESG relevance should at least be screened. A short ESG paragraph in the scope of work clarifying what has been considered and to what depth, can already enhance transparency and set realistic expectations about the time and expertise involved. It also provides a natural starting point for discussing fees where ESG analysis is clearly extending beyond a traditional minimal scope.

During inspection and data collection, the ESG-REV Matrix encourages valuers to structure their observations by pillar and to record the reliability of each piece of information. An EPC, as a certified energy performance report, will typically fall under Measured or Audited data. A CRREM alignment analysis provided by the owner's consultant may be treated as Audited if backed by documentation or as Declared if it has not been independently verified. Well-being features such as daylight or acoustic quality may initially be recorded as qualitative observations, but can be progressively linked to structured frameworks for workplace health where available [7, 15–16]. Governance indicators such as the existence of green leases or documented ESG policies are often verifiable through lease reviews and corporate reporting.

"A short ESG paragraph in the scope of work clarifying what has been considered and to what depth, can already enhance transparency and set realistic expectations about the time and expertise involved. It also provides a natural starting point for discussing fees where ESG analysis is clearly extending beyond a traditional minimal scope."

In practical terms, the valuer's engagement with social and governance aspects remains primarily qualitative. Social factors relate to the lived experience and functional performance of buildings, influencing tenant retention, occupancy stability or the long-term attractiveness of a location. Governance relates to the integrity and usability of information, including the consistency of documentation, the traceability of data, the maturity of transformation plans and the credibility of the owner's sustainability commitments. At this stage of the profession's evolution, the task is not to measure these effects with precision but to recognise their potential relevance, evaluate the reliability of the supporting evidence and articulate how they shape valuation uncertainty, risk perception or confidence in cash flow assumptions.

A practical methodological limitation, relevant for many European valuers, concerns the scope of CRREM. The tool now covers commercial and residential real estate at whole building level and is well suited to institutional portfolios, where energy and emissions data can be collected for entire buildings [6,8]. It does not, however, provide pathways or data structures for individual residential units. Individual apartments, with fragmented ownership and mixed metering systems, fall outside this architecture. For valuers, this means that CRREM style analysis often cannot simply be applied unit by unit. It requires approximations or building level proxies, and the limitations of these approaches should be made explicit in the valuation file rather than hidden.

The key point at this stage is not to chase perfection but to be explicit. The question is what was examined, where the information came from, how strong the evidence is and what remains uncertain. This explicitness is essential for later auditability, especially where valuations feed into bank risk models or sustainability disclosures. It also supports a more honest discussion with clients when data are missing or of low quality.

When it comes to modelling and interpretation, ESG-REV insists that ESG should be channelled through risk, cash flows and value, not dropped into a black box as a percentage adjustment. A CRREM misalignment year in 2030, for instance, may suggest that major retrofit works will be needed by the end of this decade. Rather than applying a fixed percentage adjustment to capital value, the valuer can consider whether any credible evidence indicates how markets are beginning to respond to assets that differ in their expected alignment or misalignment. In most segments such evidence remains limited or non standardised, which means that CRREM analysis currently serves primarily as a tool for framing regulatory and transition risk rather than as a direct source of price differentiation. Its potential relevance for market-based valuation outcomes may increase as more consistent evidence emerges.

The valuer can also discuss with the client how likely it is that CAPEX will be invested by the current owner, by a future purchaser or not at all, and what that implies for holding period, rent profiles and exit yields. Where a DCF approach is used, the likely retrofit timing and associated downtime can be reflected in the cash flow projection, including the temporary impact on net operating income and potential changes in operating expenditure (OPEX).

A complementary analytical element presented in the CRREM methodology is Carbon Value at Risk (CVaR). In the CRREM framework CVaR represents the net present value of future carbon cost exposure that arises when the emissions of an asset exceed the relevant decarbonisation pathway. CVaR therefore provides a single metric that expresses the scale of transition risk embedded in a building's projected misalignment. Although it is not yet used in valuation practice or relied upon by lenders in many European markets including Poland, it offers a transparent way of understanding the potential financial implications of regulatory tightening and increasing carbon pricing. [6]. It converts excess emissions into a monetary figure by applying forward looking carbon price assumptions and discounting them over time, which quantifies the financial sensitivity of an asset to transition policies. Providers such as MSCI apply a similar logic in their climate risk frameworks, combining asset level emissions intensities with scenario-specific carbon price trajectories to estimate the downside risk embedded in transition pathways [9].

"... valuation assignments are usually constrained by fee levels and timeframes that were set when ESG analysis was not yet as central. In many markets, ESG focused technical due diligence now costs more than the valuation itself. Yet, expectations from banks and investors still tend to shift a significant part of the interpretative burden to the valuer. This creates a structural tension."

For valuers, CVaR is not a direct input into Market Value. Instead, it functions as a transparency tool that supports prudential dialogue with lenders and investors. It enables valuers to articulate, in monetary terms, the magnitude of potential transition costs while clearly distinguishing such scenario-based metrics from the numeric value reported under EVS, IVS or the RICS Red Book. In the ESG-REV Matrix, CVaR contributes to the risk narrative. It helps explain how transition exposure may influence cash flow assumptions, retrofit timing or valuation uncertainty without imposing formulaic adjustments.

The absence of widely accepted benchmarks for retrofit costs becomes particularly visible at this stage. ESG due diligence providers often work with detailed bottom up engineering models that are costly and time consuming. By contrast, valuation assignments are usually constrained by fee levels and timeframes that were set when ESG analysis was not yet as central. In many markets, ESG focused technical due diligence now costs more than the valuation itself. Yet, expectations from banks and investors still tend to shift a significant part of the interpretative burden to the valuer. This creates a structural tension. If valuers are expected to integrate retrofit scenarios, CAPEX envelopes and disruption assumptions into every loan valuation, the profession needs either access to shared benchmark data, for example a European repository of typical retrofit packages and cost ranges, or a recalibration of remuneration to reflect the expanded scope and risk profile of the work.

This approach to ESG respects the Market Value canon while acknowledging that ESG risks are real, forward-looking and, in many markets, progressively priced. It also aligns with the evolving expectations of banks and supervisors, who are more interested in the transparency and plausibility of the risk narrative than in any particular predefined "ESG premium" or "ESG discount".

At the reporting stage the ESG-REV methodology requires valuers to present their reasoning in a transparent and traceable manner while avoiding unnecessary academic elaboration. Disclosure is not a reproduction of the entire matrix but a structured explanation of the steps taken within the ESG-REV process. This includes identifying the ESG factors considered to be material, assessing the quality and certainty of the available evidence, interpreting the relevance of this evidence within the risk cash flow value logic and explaining how these interpretations informed the valuation parameters. The extent of disclosure should reflect the complexity of the asset and the breadth of environmental social and governance considerations examined in the ESG-REV Matrix. The purpose is to allow the reader to understand how each relevant ESG element was assessed and how it shaped the valuer's judgement without overwhelming the report. Such structured disclosure increases the transparency of the valuation process and strengthens stakeholder confidence by reducing the risk that ESG integration will be perceived as opaque or subjective.

6. Transformation as investment in resilience

Much of the public debate around ESG and real estate has presented sustainability as a cost burden. Energy renovations, low carbon retrofits, structural adaptation to flood or heat risk and the creation of healthier indoor environments all require significant capital expenditure. In the short term they can depress net operating income and create disruption.

However, the regulatory and market developments described above show that non transformation carries its own costs. These include higher transition risk, the possibility of brown discounts in future transactions, restrictions on letting or financing for non compliant assets, higher insurance premia where climate risks are not addressed and a shrinking pool of occupiers whose own ESG policies limit them to better performing buildings.

From the perspective of valuation, the critical point is that investment in ESG is fundamentally an investment in resilience. Retrofit CAPEX that restores CRREM alignment and secures compliance with future EPBD requirements is not only a cost to be subtracted from today's value. It is also a means of stabilising future cash flows, safeguarding exit liquidity and maintaining relevance in a decarbonising economy [2,6]. This logic applies both at asset and portfolio level. A portfolio without a credible transformation pathway may show acceptable current yields but still be exposed to concentrated transition shocks, while a portfolio that has already monetised retrofits in the form of completed works and improved performance may appear more expensive today but better positioned under future regulation and pricing.

The ESG-REV Matrix helps valuers make this logic explicit. By linking ESG indicators to risk and cash flow channels and by distinguishing short term impacts, such as temporary void during renovation, from long term benefits, such as improved tenant retention, lower regulatory risk and reduced exposure to carbon pricing, it allows valuations to reflect transformation as a time profiled investment in resilience rather than as a blunt immediate penalty.

This way of thinking is also more consistent with how banks and regulators increasingly view sustainability. Recent guidelines on the management of environmental, social and governance risks encourage financial institutions to take a long-term view of risk, to integrate ESG into their business models and to develop transition plans aligned with regulatory objectives [5]. Assets and portfolios that have a clear, financed pathway to compliance and decarbonisation are therefore less risky from a prudential point of view than those where ESG issues remain unaddressed. From this perspective, the monetisation of retrofits through explicit CAPEX and cash flow planning becomes a core element of risk management rather than an optional upgrade.

Valuers cannot predict policy or price the future with certainty. They can, however, document how transformation plans, or the absence of such plans, influence the resilience of individual assets and portfolios. By doing so, they support better capital allocation, more candid risk disclosure and, ultimately, a more stable property market.

"Transformation is not a cost. It is an investment in resilience." In a holistic ESG valuation paradigm, this is not a slogan but a description of how risk and cash flows behave over time when framed in an institutionally consistent way.

7. Conclusion: towards a more integrated and harmonious practice

The shift from energy-only thinking to holistic ESG valuation is not a theoretical exercise. It is a practical response to an institutional landscape in which sustainable finance regulation, corporate reporting, prudential supervision, and professional standards are converging around the expectation that ESG will be treated as a normal part of valuation reasoning. At the same time, it reflects the reality that banks, under supervisory pressure, increasingly rely on valuers to provide clarity on ESG related risks, even when scope definitions or remuneration do not fully recognise this additional analytical burden.

This article has argued that three elements are crucial for valuers navigating this shift. First, a broader analytical lens on ESG is needed, one that moves beyond EPC ratings and considers climate risk, circularity, water, social well-being, and governance quality through their implications for risk, cash flows, and value. Second, a clearer understanding of the regulatory imperative is necessary, particularly how the EU Taxonomy, the EPBD, the CSRD, the ESRS, and banking rules shape the environment in which valuations are interpreted, even if they do not mandate specific numerical outcomes. Third, progress requires a procedural foundation that supports consistent and reproducible treatment of ESG information across assignments. The ESG-REV approach introduced here provides the basis for such a foundation by outlining how identification, verification and interpretation can be structured in a transparent and comparable manner. Its full operationalisation, including the complete Matrix that standardises these stages, will be presented in the next article in this series.

Even without full formal harmonisation between standards in the near term, valuers operate within a regulatory environment that increasingly requires methodological clarity and consistent treatment of ESG related information, particularly environmental data, given the current scope of European legislation. By applying a structured ESG integration process, and by documenting evidence provenance and reliability, valuers can demonstrate how relevant environmental, social, and governance considerations inform risk assessment and valuation reasoning. Such transparency improves the alignment between valuation outputs and the expectations of users of valuations, including lenders subject to supervisory requirements, while maintaining the independent role of valuation practice rather than subsuming it into the domain of sustainable finance.

The objective is not to create a separate class of ESG valuations. It is to normalise ESG-aware valuation, in which sustainability related risks and opportunities are considered with the same analytical discipline as any other factor influencing value. The next article in this series will present the full ESG-REV Matrix and address the practical question of how this framework can be implemented in day-to-day valuation workflows. When this occurs, the evolving paradigm described here will cease to appear innovative and will instead reflect established professional competence in an ESG driven real estate market.

List of Abbreviations

CAPEX — capital expenditure

CRREM — Carbon Risk Real Estate Monitor

CSRD — Corporate Sustainability Reporting Directive

CVaR — Carbon Value at Risk

DCF — discounted cash flow

EBA — European Banking Authority

ECB — European Central Bank

EPBD — Energy Performance of Buildings Directive

ESG — Environmental, Social and Governance

ESG-REV Matrix — ESG Matrix for Real Estate Valuation

ESRS — European Sustainability Reporting Standards

EVJ — European Valuer Journal

EVS — European Valuation Standards

IVS — International Valuation Standards

IVSC — International Valuation Standards Council

OPEX — operating expenditure

R-CF-V — Risk-Cash Flow-Value

RICS — Royal Institution of Chartered Surveyors

TEGOVA — The European Group of Valuers' Associations

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Abstract of Article 3 in the series

This third article in the series presents, for the first time, the full ESG REV Matrix, the ESG Matrix for Real Estate Valuation, as a comprehensive procedural framework for integrating environmental, social and governance considerations into valuation practice. Building on the conceptual and methodological foundations developed in the earlier articles, it shifts from identifying the need for structured ESG integration to outlining a complete operational system that valuers can apply in a transparent and reproducible manner. The ESG REV Matrix provides a coherent approach to identifying relevant ESG factors, assessing the provenance and reliability of supporting evidence, interpreting their implications for valuation reasoning and documenting this process with conceptual clarity.

The article explains the logic, structure and procedural stages of the ESG REV Matrix and illustrates how it can support consistent ESG consideration across different valuation contexts. It also situates the framework within the evolving regulatory and professional landscape and explores how it can be applied in ways that respect Market Value conventions while also supporting more cautious valuation reasoning where this is required. Particular attention is paid to the challenges created by uneven data availability, varying regulatory requirements and the need to distinguish between qualitative assessments and evidence capable of influencing valuation parameters.

The purpose of this article is not to introduce a new valuation methodology; it is to provide valuers with a structured, transparent and defensible workflow that enhances the robustness of professional judgement and facilitates the integration of ESG considerations into established valuation practice. By presenting the full ESG REV Matrix, the article completes the methodological phase of the series and prepares the ground for future empirical testing and practical application.

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BUSINESS VALUATION

#07 Impairment testing – What, When and How

Nina Milenković

Introduction

Impairment testing is one of the most critical aspects of financial reporting under International Financial Reporting Standards (IFRS). It ensures that assets are not carried in the financial statements at amounts greater than those that the entity can recover from an asset, either by using it or by selling it (recoverable amounts). This safeguards the reliability and transparency of financial information provided to investors, regulators, and other stakeholders. Moreover, this aligns financial reporting with the fundamental principle of faithful representation in IFRS.

The accounting standard that governs impairment is IAS 36, Impairment of Assets, which sets out the principles for identifying, measuring, and recognising impairment losses and reversals.

1. What is the Subject of Impairment Testing?

It can be said that IAS 36 is applied to all those assets owned by a company whose value is not remeasured frequently and which may lose value due to factors that are not directly related to their condition and/or use.

In other words, it is applied to almost all long-term assets:

- property, plant, and equipment (IAS 16)
- intangible assets (IAS 38)
- goodwill (IFRS 3)
- investments in subsidiaries, associates, and joint ventures (IAS 27, IAS 28)
- right-of-use assets (IFRS 16)

However, certain assets are excluded (IAS 36.2), such as inventories, deferred tax assets, employee benefit assets, financial assets, investment property at fair value, and biological assets at fair value.

According to IAS 36.6, an asset is impaired when its carrying amount exceeds its recoverable amount. The carrying amount refers to the book value of the asset as shown in the financial statements (historical cost less accumulated depreciation/amortisation and accumulated impairment losses), while the recoverable amount is defined as the higher of fair value less costs of disposal (FVLCOD) and value in use (VIU). If an asset's carrying amount exceeds its recoverable amount, the difference is recognised as an impairment loss.

Clear identification of the assets or group of assets to be tested is of crucial importance, as type of assets determines specific details in the application of the methodology.

2. When is Impairment Testing Required?

For most assets, impairment testing is required only when there is an indication that an asset may be impaired (IAS 36.9). Therefore, for most assets, it is first necessary to determine whether there are indications of impairment.

Indications of impairment can be external (market decline, adverse changes in environment, interest rate increases, market capitalisation below net assets) or internal (obsolescence, damage, underperformance). Analysis of impairment indications includes (but is not limited to):

- overview of macroeconomic environment
- industry overview
- analysis of interest rates
- comparison between net assets, market capitalisation and value of investment
- changes in assets' use
- conditions of the assets
- prices of comparable assets on the market
- financial performance of the entity/assets owner, etc.

Certain assets require mandatory annual impairment testing, regardless of indicators:

1. Goodwill – IAS 36.90
2. Intangible assets with indefinite useful lives – IAS 36.10(a)
3. Intangible assets not yet available for use – IAS 36.10(b)

Annual impairment tests for goodwill and indefinite-life intangibles can be performed at any time during the year, but must be done consistently at the same time each year.

3. How to Perform Impairment Testing?

3.1 IAS 36 Requirements

Impairment testing consists of two steps:

- estimating the recoverable amount, and
- comparing it with the carrying amount.

If carrying amount is higher than recoverable amount, an impairment loss is recognised. If carrying amount is less than recoverable amount or equal to it, there is no impairment (but no increase in assets value should be recorded).

The recoverable amount is the higher of the amounts that entity could expect either from selling assets or from using them:

- FVLCOD: what the asset could be sold for in the market, minus selling costs (legal fees, commissions, removal costs, etc.).
- VIU: present value of future cash flows generated only by tested assets in current use, i.e. without any significant improvements or including new assets. Includes cash inflows from use of the asset, cash outflows to operate it, and discounting to present value.

There is no need to determine both FVLCOD and VIU. If one of them is determined and exceeds carrying amount, there are no impairment losses and further calculation is unnecessary.

It is usually feasible to determine FVLCOD for individual assets using some of the valuation approaches, mostly market approach (direct comparison of market prices for comparable assets) or cost approach (depreciated replacement cost method) in case of property, plant and equipment (PP&E). However, it is almost impossible to determine value in use (VIU) at the level of individual assets. In such cases, IAS 36 requires that the impairment test be performed at the level of a cash-generating unit (CGU).

A cash-generating unit (CGU) is defined in IAS 36.6 as the smallest identifiable group of assets that generates cash inflows largely independent of cash inflows from other assets.

If impairment losses are identified for CGU, they are allocated first to goodwill, then pro rata to other assets. However, if in future years circumstances significantly improve and the causes of impairment are no longer in place, impairment reversals are possible and allowed, except for goodwill which cannot be reversed.

3.2 Methodological Considerations regarding VIU

The determination of VIU is essentially a valuation based on the discounted cash flow method. Therefore, as in any other valuation, cash flows must reflect the valuation subject and purpose.

Valuation purpose is clearly impairment testing, so requirements of IAS 36 must be fulfilled. Valuation subject is the asset or group of assets/CGU belonging to one of categories listed in section 1. Depending on category, specific characteristics of cash flow will be applied, as presented in the following table.

	INVESTMENTS	GOODWILL	ASSETS
Useful life	Indefinite	Mainly Indefinite	Finite, the remaining asset life
Debt Servicing	After	Mainly before	Before
Taxation	Mainly after	Before	Before
Working Capital	Required	Required	May or may not be required
Terminal/ Residual Value	Capitalisation or market multiple	Capitalisation	Remaining (residual) value
Discount Rate	Cost of Equity or WACC[1]	WACC	Derived from WACC[2]
Final Value	Equity	Enterprise Value (EV) or Equity	Enterprise Value alike[3]

Table 1. Cash Flow Characteristics for Different Subjects of Testing

To ensure consistency between cash flows and discount rate, a valuer must bear in mind specific requirements for discount rate.

	INVESTMENTS	GOODWILL	ASSETS
Taxation	Consistent with cash flows	Before	Before
Capital Structure	Market	Market	Market, but related to assets financing
Cost of Debt	Market	Market	Market
Additional Risk Premiums	Specific Company Risk (SCR) from market participants' perspective	SCR from market participants' perspective	SCR from market participants' perspective

Table 2. Discount Rate Characteristics for Different Subjects of Testing

Once Value in Use is calculated, the next step is comparison with the carrying amount of tested asset(s). The consistency is again the critical issue.

	INVESTMENTS	GOODWILL	ASSETS
Carrying Amount	Book Value (BV) of Investment (not BV of net asset in subsidiary)	BV of net assets in CGU plus GW plus intangibles from transaction (net debt adjustment if VIU is expressed in EV form)	BV of fixed assets adjusted for NWC and marketable assets in accordance with CF

Table 3. Carrying Amount to Be Compared with VIU

In general, carrying amount must be expressed in the same way as final value in use.

1 Depends on whether cash flows are to firm or to equity. It is acceptable to calculate EV, but it must be transformed to equity at the end.

2 Capital structure relates to source of assets purchase financing.

3 Similar to EV, no debt subtracting, but it is value in use of assets.

3.3 Practical Challenges

Although guidelines for impairment testing are quite clearly defined, there is always room for mistakes. For example, although it is very similar to business valuation, the valuer must bear in mind that (a) only the assets owned by the entity at the testing date are tested, and (b) the same or similar condition of the assets and their use is assumed.

Some challenging topics are:

- **Cash flow projection**: in line with the foregoing, the projection must not include any significant expansion (new assets) or improvement of the assets, nor the results of operations that would arise from such changes. Only replacement capex should be included. Further, in case of indefinite projection period length, sustainable long-term growth rate should be determined.
- **Selection of the method for determining the recoverable amount**: it depends mostly on the type of assets. For PP&E, especially commercial real property, FVLCOD is sometimes the best choice. On the other hand, if property is industrial, it could be difficult to find market comparables, so then VIU is the preferable choice. Goodwill is always tested using VIU, while investment testing is the most similar to business valuation and sometimes it is acceptable to use a market or asset-based approach.
- **CGU determination**: the primary challenge is identifying the "smallest identifiable group of assets that generates cash inflows that are largely independent". It could be each production line in the factory or the operating segment or each oil station / retail store / restaurant within chain, etc. But sometimes it could be even holding company level if the key operating and managing functions are centralised (e.g. foreign trade, pricing policy, international loans, etc.). When CGU is of lower level than entity, allocation of shared (corporate) assets and overheads must be done carefully – inappropriate allocation can lead to misstated carrying amounts and inaccurate impairment conclusions.
- **Consistency on all levels**: between subject of testing and chosen methodology, between cash flow and discount rate, between final form of VIU and carrying amount.
- **Taxation**: although IAS 36 requires pre-tax analysis, calculating the pre-tax discount rate can be problematic. However, pre-tax and post-tax DCF should give the same result if the appropriate discount rate is applied, so the simplest solution (widely used in practice) is to calculate VIU using post-tax cash flow discounted by post-tax discount rate, and then exclude taxes and recalculate pre-tax discount rate by iterative procedure[4].

"Taking everything into account, the impairment test involves a significant level of professional judgment, just like any other valuation."

- **Ownership share**: if investment in other entity or equity interest acquired in transaction which generated goodwill are below 100%, its carrying amount cannot be directly compared with VIU, but must first be grossed up to 100%.
- **Sensitivity analysis**: to enhance transparency, IAS 36 requires sensitivity analysis for goodwill and indefinite-life intangibles if reasonably possible changes in assumptions would lead to impairment. It is highly recommended to perform sensitivity analysis in other impairment tests as well.

Taking everything into account, the impairment test involves a significant level of professional judgment, just like any other valuation.

[4] Pre-tax discount rate is disclosure requirement of IAS 36.

4. Illustrative Example

The service company SCM acquired 100% of the equity of the service company SCD, and goodwill was identified in the PPA analysis (for the sake of simplicity, it is assumed that there are no other intangible assets). SCD continued to operate as an independent legal entity.

During 2024, a strong competitor entered the market and SCD lost some market share, which is considered a potential impairment trigger. SCM and SCD engaged the independent valuer to perform impairment testing of the following:

- assets of SCD
- goodwill recorded in financial statements of SCM, and
- investment in equity of SCM recorded in financial statements of SCM

After appropriate analysis, the valuer decided to consider the entire CSD as a single CGU and to use VIU, i.e. discounted cash flow, in all three tests. Further steps were:

- cash flow projection
- determination of WACC(s)
- calculation of VIU
- calculation of carrying amounts
- conclusion on impairment

Cash flow projection for five years was the same for all three tests, as follows.

000 EUR	FY24A	FY25F	FY26B	FY27B	FY28B
Revenue	**9,622**	**8,852**	**9,295**	**9,759**	**10,247**
Expenses	**(9,276)**	**(8,027)**	**(8,331)**	**(8,646)**	**(9,064)**
EBITDA	**345**	**825**	**964**	**1,113**	**1,184**
EBITDA margin	3.6%	9.3%	10.4%	11.4%	11.6%
Depreciation & amortisation	-(79)	-(207)	-(217)	-(228)	-(239)
EBIT	**266**	**618**	**747**	**885**	**945**
Tax	(40)	(93)	(112)	(133)	(142)
NOPLAT	**226**	**526**	**635**	**753**	**803**
Depreciation & amortisation	79	207	217	228	239
CAPEX	-(23)	-(155)	-(184)	-(216)	-(239)
NWC	109	-(51)	12	12	12
Free cash flow	**391**	**527**	**679**	**776**	**815**

Table 4. Cash Flow Projection

The next step was to determine discount rate. After industry and peer group analysis, the valuer concluded that financing structure is different for PP&E and for business and calculated two discount rates, as follows:

WACC	GWIT, INVESTMENT	ASSETS
Re-levered beta	0.65	0.65
Market risk premium	5.0%	5.0%
Risk-free rate of return (including country risk)	4.8%	4.8%
Size cap premium	1.5%	1.5%
Cost of Equity	**9.6%**	**9.6%**
Corporate income tax rate	15.0%	15.0%
Pre-tax cost of debt	5.6%	5.6%
Debt / Equity ratio	0.25	1.50
Post-tax WACC	8.6%	6.7%

Table 5. Discount Rates

Long-term growth rate is determined at 2%, in line with expected inflation. Remaining useful life of PP&E is estimated at 15 years. Applying appropriate calculation of terminal/residual value as well as appropriate discount rates, results were as follows.

VALUE IN USE OF SCD			
000 EUR	Investment	Goodwill	Assets
Present values of free cash flows	2,347	2,347	7,319
Present value of terminal/residual value	9,416	9,416	3,388
Adjustment	-	-	(181)[5]
Value in use	**11,763**	**11,763**	**10,525**

Table 6. Value(s) in Use

Carrying amount is calculated from balance sheet figures.

[5] Net working capital at beginning of projection period

SCD	000 EUR
Non-current asset	10,326
Current asset	5,885
Non-current liabilities	1,540
Current liabilities	8,183
Net asset	**6,488**
Cash	**1,414**
Short-term investments	
Total Debt	**3,071**
Net Debt	**1,657**
Enterprise Value	**8,145**
Goodwill	3,279
Carrying amount of CGU	**11,424**

Table 7. Balance Sheet and Carrying Amount(s) Calculation

Finally, the valuer performed comparison and concluded on impairment.

Investments Impairment Summary	000 EUR
000 EUR	**SCD**
Enterprise Value	11,763
Net Debt	(1,657)
Estimated equity value	10,106
Carrying value of SCD's equity	6,488
Difference	3,618
Impairment	**NO**

Goodwill Impairment Summary	000 EUR
000 EUR	**SCD**
Value in use	11,763
Carrying value of CGU	11,424
Difference	339
Impairment	**NO**

Assets Impairment Summary	000 EUR
000 EUR	**SCD**
Value in use	10,525
Carrying value of SCD's assets	10,326
Difference	199
Impairment	**NO**

Table 8. Impairment Tests Summary

All three tests resulted in a “no impairment” conclusion.

However, taking into account low levels of so-called headroom (the difference between value in use and carrying amount) for goodwill and assets, sensitivity analysis is unavoidable. It would be recommendable to calculate break-even points of key parameters in order to more easily observe critical levels while monitoring changes in key assumptions.

5. Conclusion

Impairment testing under IAS 36 ensures assets are not overstated and provides transparency to stakeholders.

- **What**: PP&E, goodwill, intangible assets, investment in subsidiaries, right-of-use assets
- **When**: upon impairment triggers, and annually for goodwill and indefinite-life intangibles
- **How**: recoverable amount = higher of FVLCOD and VIU, compared with carrying amount, with losses recognised in profit and loss statement

The requirements of IAS 36 are complex and involve a high level of professional judgment within a framework established by specific guidelines. However, particular attention must be paid to the specific characteristics of cash flows, discount rates and carrying amounts, depending on the subject of the impairment test, as well as to consistency, which is a must in every valuation task, including this one.

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#08 Modern approaches to business and digital asset valuation in the context of disruptive change and ESG factors (II)

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Editor's note:

In Part I (EVJ n° 37, November 2025), the author explored the key theoretical questions:

- How can digital assets, intangible resources, and ESG factors be quantified in valuation models?
- Is it possible to develop a reliable framework that integrates these variables into existing methodologies?
- How do different value adjustment approaches impact the final valuation outcome?

This Part II presents a methodology for digital asset valuation.

1. Methodology for digital asset valuation

Valuation Approaches

The most used approaches for valuing digital assets are cost approach, income approach, and market approach.

The cost approach values the asset based on the costs of development or replacement of the digital resource. This method is relatively simple but does not consider the market potential and user value[2].

The income approach (Discounted Cash Flow – DCF method) values the asset based on the future cash flows that the digital asset can generate, discounted to their present value. The key challenge is accurate forecasting of cash flows in a dynamic digital environment[3].

The market approach values the asset by comparing it with similar digital resources or transactions on the market. A limiting factor is the lack of transparency and comparable data[4].

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2 IASB. (2022). Intangible Assets Reporting Framework

3 Koller, T., Goedhart, M., & Wessels, D. (2020). Valuation: Measuring and Managing the Value of Companies. Wiley i Copeland, T., & Antikarov, V. (2001). Real Options: A Practitioner's Guide

4 RICS. (2022). Valuation of Businesses and Intangible Assets

Real Options and Scenario Modelling

Real options and scenarios are types of modelling used to incorporate flexibility and uncertainty through options such as expansion, deferral, or abandonment of a project. Scenario modelling involves developing alternative future paths of external factors and assessing how they affect business value. Examples of scenarios relate to macroeconomic, regulatory, technological, and market factors. Macroeconomic models include GDP growth, inflation, and interest rates. Regulatory models pertain to changes in laws and other regulations (e.g. taxes, ESG regulations). Technological scenarios address the emergence of disruptive technology, while market scenarios cover competitor entry, changes in consumer preferences, etc.

In the model, different cash flows, discount rates and growth expectations are projected for each scenario. Valuation functions through a combination of DCF + real options + scenarios. First, a base DCF model with baseline assumptions is created. Then scenarios are developed, such as base, optimistic, pessimistic, extreme or others. For each scenario, cash flows and firm value are estimated.

Real options are valued using models such as Black-Scholes, if parameters are known, or binomial models when dealing with multiple stages and outcomes, or decision trees[5]. The total value is obtained by summing the DCF value with the values of real options or by a weighted average of multiple scenarios plus an added option for flexibility.

A practical example from the energy sector is the company GreenSolutions's plans to invest in a solar farm. However, uncertainties remain: Will the EU increase CO_2 credit prices? Will regulators approve subsidies? Using scenario modelling, the company develops three scenarios: optimistic, base case, and pessimistic, with elements outlined in the table.

Scenario	CO_2 Prices	Subsidies	Net Cash Flow	Value
Optimistic	Rising	Yes	€5 million annually	€50 million
Base case	Slightly rising	Partial	€3 million annually	€35 million
Pessimistic	Declining	No	€1 million annually	€20 million

Scenario Analysis - GreenSolutions

Next, a real option is added, giving the company the possibility to proceed or abandon depending on regulatory conditions. This option is valued at an added €6 million. The final firm value = weighted scenario value + option value = €40.25 million + €6 million = €46.25 million. The weighted value is derived from the probability distribution of scenarios: 45%, 45%, and 10%.

The real options and scenario modelling framework adds a dimension of strategic flexibility to traditional models. It better captures uncertainties and variable risk factors. This approach is especially applicable to digital, startup and high-risk sectors. It requires more knowledge and data but provides deeper insights and a stronger negotiating position.

Data Analytics and AI Based Methods Application of machine learning models identify value drivers and predict value in real-time.

[5] **Binomial Trees**: A step-by-step model that simulates possible price paths of an asset over time, allowing for option valuation by backward induction at each node. **Black-Scholes**: A continuous-time formula that calculates the theoretical price of European options using assumptions like constant volatility and no early exercise. **Decision Trees**: A graphical model used to evaluate different choices under uncertainty by mapping decision points, possible outcomes, and payoffs, often incorporating real option logic.

Summarising comparisons of classical and adjusted valuation methods are:

- Traditional DCF vs. DCF with adjustments for digital assets and ESG factors
- Market multiples (EV/EBITDA, P/E) vs. ESG-adjusted multiples
- Real options (Black-Scholes, binomial models) for AI platforms and intellectual property
- Direct value adjustments through specific risk and opportunity factors
- AI-based models using large datasets for valuation

Key Challenges

Valuing digital assets faces several significant challenges. Lack of standardisation is one, as there is no unified international standard covering all types of digital assets and their specificities. Digital technology becomes obsolete rapidly, so the value of a digital resource can vary drastically over a short period due to technological changes.

Regulatory uncertainty is present due to frequent changes in areas such as data protection regulations (e.g. GDPR), digital asset frameworks, and artificial intelligence (AI) legislation. This volatility affects the valuation of digital assets.

Certain intangible factors are difficult to quantify, such as user trust, brand reputation, and network effects.

Security risks and cyber threats directly impact the value of digital systems and data, and these risks are inherently difficult to predict.[6]

2. Specific factors – ESG factors and sustainability

ESG Factors as a Strategic Variable

ESG stands for Environmental, Social and Governance. It is an internationally recognised framework for evaluating a company's sustainability and social responsibility. In the context of business valuation, ESG factors can significantly influence risk perception, the discount rate (Ke), corporate reputation, access to capital (e.g. green funds), long-term growth, and overall sustainability.

ESG components include, under environmental factors: CO_2 emissions, energy efficiency, and waste management. Social factors refer to: workers' rights, occupational safety, and impact on the local community. Governance factors include transparency, corporate governance, ethics, and anti-corruption measures.

Companies with high ESG ratings often have a lower discount rate due to reduced reputational and regulatory risks. Poor ESG performance may require value adjustments due to increased risk exposure.

Investors and market regulators are increasingly demanding that companies demonstrate sustainable business practices. Therefore, ESG factors are becoming an important input in the valuation process. Quantifying these factors and integrating them into DCF models or multiple-based analyses presents both a challenge and an opportunity for business differentiation in the market[7].

Example of the application of the ESG methodology in the valuation of GreenSolutions led to an upgrade in its investment rating among funds that invest in "green projects". The integration of ESG factors contributes to the reduction of systemic risks, enhances transparency, and strengthens corporate reputation.

[6] Deloitte. (2023). Cybersecurity Risks and Valuation Impact

[7] MSCI (2023). ESG Ratings Methodology. [13] BlackRock (2021). Sustainable Investing Report.

Challenges and Shortcomings in Current Practice

Valuation professionals today face multiple challenges: high inflation complicates the determination of discount rates; fluctuating interest rates impact the present value of future cash flows; and geopolitical uncertainties affect market risks and operational stability. For startups lacking historical financial data, valuation increasingly relies on qualitative indicators and alternative data sources.

Additionally, the lack of regulatory guidelines for valuing AI models, databases and digital products leaves room for subjectivity and inconsistency among valuers, further complicating practice in this domain.

EVS-BV Standards and Development Directions

The European Business Valuation Standards (EVS-BV) represent an important framework for ensuring consistency and transparency in valuation practice. EVS-BV recommends a multi-method approach and acknowledges the relevance of intangible assets and ESG factors. However, there are persistent challenges, including the absence of precise guidelines for valuing digital assets, algorithms, and companies with unstable revenues.

Future development directions include the creation of adaptive valuation models, strengthening of professional education and capacity-building for valuers, and cooperation with EVS and IVSC bodies to harmonise European and international standards.[8]

Models for ESG Factor Quantification

In accordance with EVS-BV 2020 and EVS 2025 recommendations, ESG factor quantification is conducted. Discount rate adjustments typically range from ±0.5% to ±2.0%, depending on the ESG rating. Direct value adjustments range from 3% to 10%, depending on reputation, regulatory compliance and ESG-related benefits.

An empirical example from GreenSolutions confirms that ESG factors affect:

- Cost of capital (Ke)
- Credit rating and access to green financing
- Market perception and valuation multiples

3. ESG factors as positive or negative adjustments

Methodological Basis

According to EVS-BV 2020, IVS 2024 and EVS 2025, the Build-Up method must be adaptable to the actual risk profile of a business. A specific risk does not necessarily imply a negative adjustment. If a company possesses strengths that reduce risk, these should be reflected as a negative premium. Therefore, the valuer must clearly explain the rationale in the valuation report to avoid misinterpretation.

[8] EACVA (2020). European Business Valuation Standards (EBVS), EVS (2025). European Valuation Standards i IVSC (2023). AI and Intangibles Working Group Reports

[9] S&P Global Market Intelligence – from "Green loans promise a lower cost of capital, OECD (2020) – "ESG Investing: Practices, Progress and Challenges", MSCI ESG Research – Reports on the correlation between ESG ratings and cost of capital, PwC (2022) – "The ESG imperative in valuation"

It is justified to apply a negative adjustment to the discount rate in the following situations:

- A firm with the highest ESG score in its sector has reduced reputational and regulatory risk, justifying a negative adjustment that increases its value.
- A company with high product and market diversification reduces operational risk and thus reduction of discount rate.
- Firms with long-term contracts with government entities face lower revenue risk, supporting a downward adjustment.
- An experienced management team and a strong business history indicate lower governance risk and justify a favourable correction.

While theoretically justified, negative adjustments are rarely applied in practice, as they require strong evidence, benchmarking, and may raise concerns about "overly optimistic" valuations.

The conclusion is that positive corrections (risk premiums) are standard and increase the cost of equity (Ke), whereas negative corrections (discounts) are possible, but only when supported by evidence, and serve to reduce the cost of equity.

Type of Adjustment in the Direct Adjustment Method

Adjustments based on specific factors can be positive or negative.

- A negative adjustment (discount) reduces value due to risks, weaknesses, uncertainties and threats.
- A positive adjustment (premium) increases value due to strengths or factors not captured by the valuation model.

An example of a negative adjustment is a company that depends on a single supplier, suffers from brand damage, or is subject to litigation that would warrant a discount. If the correction factor is –15%, and the DCF valuation is:

$$€1{,}000{,}000, \text{ the adjusted value is } €1{,}000{,}000 \times (1 - 0.15) = €850{,}000$$

An example of a positive adjustment is a firm with strong customer loyalty, a recognised brand, a strategic partner or above-average ESG performance (not captured in the model) that may receive a premium. If the correction factor is +10%, and the base value is €1,000,000, the adjusted value is:

$$€1{,}000{,}000 \times (1 + 0.10) = €1{,}100{,}000$$

Positive adjustments are justified in situations where:

- Reputation or brand value is not captured in accounting statements
- A patent under development has significant potential but does not yet generate revenue
- ESG factors are favoured by the market but not reflected in cash flows
- There is a potential acquisition or entry of a strategic investor not priced in the market

Positive adjustments are less common and must be thoroughly documented. Standards such as IVS, EVS and EVS-BV require clear disclosure and justification of all correction factors, ensuring no double-counting occurs—especially if already accounted for in the discount rate (Ke) within the DCF model. The valuer should assess positive and negative factors independently.

Conclusion:

- Negative adjustments are applied in the presence of risks, weaknesses and uncertainties.
- Positive adjustments reflect strengths or value drivers not captured in the model.The direct adjustment method is flexible and can reflect both positive and negative company characteristics not covered by standard valuation inputs.

Type of Adjustment in the Build-Up Method for the Discount Rate

The standard Build-Up formula is:

Ke = Rf + ERP + Size Premium + Specific Risk Premium

Where:
Rf = Risk-free rate (e.g. government bonds)
ERP = Equity risk premium (market premium)
Size Premium = Additional risk for small companies
Specific Risk Premium = Additional risks unique to the company

In the Build-Up model, specific risks are additive and form a component of the total cost of capital. However, factors that reduce the discount rate include:

- Stable client base (e.g., government contracts) → lower revenue risk
- Strong ESG performance → lower regulatory and reputational risk
- Above-average liquidity and capital structure → lower market exposure
- Business diversification → lower operational risk
- Market leadership and brand loyalty → lower competitive pressures

Numerical example of a negative adjustment: If we have the following:

- Risk-free rate = 3.0%
- Equity risk premium = 5.5%
- Size premium = 1.0%
- Specific risk (e.g., ESG & stability) = – 0.5%

then

Ke = 3.0% + 5.5% + 1.0% – 0.5% = 9.0%

(Without the negative adjustment, Ke would be 9.5%)

Important: The application of negative adjustments must be well-supported and documented. It must not be arbitrary. Benchmarking against industry averages is essential. Typically, specific risk increases Ke when the company faces above-average risks compared to peers of similar size and sector. In such cases, positive adjustments are common.

Example of a typical positive adjustment:

- Rf = 3.0%
- ERP = 5.5%
- Size premium = 1.5%
- Specific risks (e.g., poor governance, damaged reputation) = 2.0%

Ke = 3.0% + 5.5% + 1.5% + 2.0% = 12.0%

This is a common case in which specific risk premiums increase the discount rate.

IVS, EVS and EVS-BV allow methodological flexibility but require transparency and justification of all adjustments. Specific risks more often result in an increase in the discount rate, but in well-substantiated cases, a reduction may be applied, particularly when ESG performance, strategic position, or other strengths are not captured through traditional metrics.

Example: If we apply a standard positive premium for specific risk, the components of the cost of equity (Ke) are as follows:

- Rf (risk-free rate) = 3.0%
- ERP (equity risk premium) = 5.5%
- Size premium = 1.5%
- Specific risk premium (e.g., weak corporate governance, poor reputation) = 2.0%

The total cost of equity (Ke) is:

Ke = 3.0% + 5.5% + 1.5% + 2.0% = 12.0%

This represents a typical case where specific risk factors increase the discount rate, reflecting elevated risk levels compared to the sector average.

4. Value adjustment as a method for valuing digital businesses

Method Description

The Value Adjustment Method starts from a base value calculated using a standard valuation model, and then applies specific corrections for risks, opportunities, or other relevant factors using adjustment coefficients, rather than incorporating all such elements into, for example, the discount rate.

Formula: Adjusted Value = Base Value × (1 – R)

Where:

R = total adjustment rate for specific risks, expressed in decimal format (e.g. 0.08 for 8%).

Example: If the base value of the company is €1,000,000 and the total risk adjustment is 8% (R = 0.08), then

Adjusted Value = €1,000,000 × (1 – 0.08) = €920,000

This method is particularly useful when it is difficult to quantify certain factors within the valuation model or when adjustment factors are external (e.g. reputation, ESG certifications, innovation). In contrast, when risks are quantifiable or when it is possible to directly identify how certain factors affect key model variables, such as through the discount rate, it may be more appropriate to integrate those factors within the model.

The direct adjustment method should be clearly documented, and the effect of each correction transparently shown, as required by EVS and EVS-BV standards.

When to Use the Direct Value Adjustment Method

This method is applied in several situations:

- Startups or digital firms without revenues: where there are no stable cash flows for a DCF model. Valuation is based on growth potential, user base, intellectual property, etc.
- Example: Base value = €1,000,000 (based on investments and IP)
- Legal uncertainty = –10%, strong user base = +5%
- Adjusted Value = €1,000,000 × (1 – 0.10 + 0.05) = €950,000
- Litigation, tax assessments, or time-pressured negotiations: analysts often apply a pragmatic and defensible direct market value adjustment.
- When financial data are unavailable: such as lack of revenue or cost data, or no detailed financial statements. Instead, market data from comparable companies (e.g. Pitchbook, CB Insights) can be used, and base value is adjusted according to development stage, team quality, revenue diversification and legal standing (e.g. AI, GDPR, IP rights).

ESG in Reputational and Non-Financial Analysis

Where ESG risks or benefits exist and are not captured by standard models, corrective adjustments are added — either positive or negative.

- Positive corrections:
  - ESG compliance: +3%
  - Green certification: +2%
- Negative corrections:
  - Reputational damage: –5%
  - Ethical risk: –3%

The direct adjustment method offers a clear way to show the impact of each specific factor.

Combining Direct Adjustments with DCF Models

Base value obtained through a DCF model using a base discount rate is then corrected for specific risks through percentage adjustments after the DCF calculation. This preserves the objectivity of the core model while allowing flexibility and transparency in incorporating additional risks.

If specific risks were directly included in the discount rate, it would lose its market anchor (i.e. no beta, no reference data), becoming a subjective mix of market and non-market risk. As a result, investors and auditors would find it difficult to validate how a discount rate of, say, 18%, was derived.

When only the discount rate is used with embedded premiums, it is unclear how much each factor contributes, since all risks are aggregated into a single number.

EVS-BV and IVS standards recommend that:

- Market risks should be reflected in the discount rate.
- Specific risks should be evaluated separately — either by adjusting the estimated value, cash flows or valuation multiples.

Advantages and Limitations

Advantages of the Direct Adjustment Method:

- Simple and fast to apply
- Suitable for startups and digital firms
- Captures ESG and other intangible factors

Limitations:

- Less precise and more subjective
- Not linked to cash flows
- May attract criticism if not well-documented and justified

5. The DCF method and specific risks

Specific risks are adjustment factors to the discount rate within the DCF method. When included in the discount rate, they increase it, thereby reducing the final estimated value. However, it is essential to distinguish situations when specific identified risks should be integrated into the discount rate and when they should not.

When Specific Risks Are Included in the Discount Rate

Specific risks are incorporated into the discount rate when sufficient market data are available to adjust the beta or add specific risk premiums to the CAPM or WACC rate (e.g. +3% for legal risk). This also applies when valuing a company for which the market already "prices in" specific risks, such as a publicly listed company with weak governance reflected in a higher beta. In cases where a simplified, single-layer model is used (e.g. for due diligence), it may be easier to negotiate based on a single discount rate. Lastly, when specific risks are relatively minor and quantifiable as premiums (ERP + alpha), one can add 1–2% to the cost of equity for factors such as country risk, management quality, or firm size.

For a small family-owned business with no market history, the discount rate can include a specific risk in the form of a size or illiquidity premium. Similarly, in valuing a company operating in a high-risk country, the country risk premium is included in the discount rate. For a public enterprise with a poor reputation, specific risk is captured through a higher beta, reflecting a weaker market perception.

When Specific Risks Are Excluded from the Discount Rate

Excluding specific risks from the discount rate avoids double-counting and ensures a transparent analysis structure. Step by step: the discount rate in a DCF model is based on market (systematic) risks. In practice, the discount rate (WACC or CAPM) is constructed from the following components: risk-free rate (e.g. Eurobonds), equity market risk premium, beta coefficient (firm volatility relative to the market) and cost of debt (interest rates, tax effects). These components reflect systematic risk—those that cannot be eliminated through diversification.

Specific risks are "idiosyncratic" and unpredictable. These include cybersecurity threats, ESG-related issues (reputational risk, founder dependency, legal uncertainty, etc.). If added to the discount rate as risk premiums (e.g. +3%, +5%), they lack market reference points and make the model opaque and difficult to validate.

Such risks are excluded from the discount rate when difficult to quantify, such as cybersecurity, ESG effects, reputation, or founder dependency. They are also excluded when the risk does not apply uniformly across all cash flows—for instance, in startups where only early-stage revenues are risky. Standards require transparency and documentation of such assumptions, hence the separate treatment of these risks. Exclusion is also justified when the goal is to show investors the distinct impact of each risk on the final valuation. Typical cases for excluding specific risks from the discount rate include:

- AI-based startup (uncertain revenue, unknown IP)
- digital platforms (regulatory and user loyalty risks)
- early-stage companies (no historical revenues, unvalidated markets)
- IP-centric firms (market valuation of IP is not quantifiable via beta)

Conclusion

In these cases, the discount rate is calculated objectively using CAPM/WACC, while specific risks (e.g. cybersecurity, ESG, reputation) are applied later as value adjustment factors. This keeps the model clean, separated, and transparent—avoiding risk duplication.

Comparison Example: Inclusion vs. Exclusion of Specific Risks

Model	Discount Rate (%)	Specific Adjustments (%)	Base Value (€)	Adjusted Value (€)	Notes
Model A – All in discount rate	18	0	1.000.000	1.000.000	Risk premium embedded in the discount rate

Model	Discount Rate (%)	Specific Adjustments (%)	Base Value (€)	Adjusted Value (€)	Notes
Model B – Post DCF adjustments	12	-6	1.000.000	formula	Adjustment separately accounts for specific factors

How to interpret the results?

Model	Value	Conclusions
A	1.000.000 €	It assumes that all risks have already been embedded in the high discount rate – but it does not provide clarity on the contribution of individual risk components.
B	940.000 €	A clear value adjustment is applied based on identified specific risk factors (–6%) – making the model more transparent and precise.

Model B is better suited for valuing digital assets and startups because the discount rate remains market-based and justifiable (e.g. based on the CAPM), while specific risk factors can be described and substantiated in detail (e.g. reputation, cybersecurity, ESG). This model also facilitates the creation of scenarios and simulations for individual risks. Ultimately, it enhances transparency for investors, auditors, and management.

Combined Approach

In many cases, a combination of both approaches and methods is used. The discount rate incorporates market and certain minor firm-specific risks (e.g. company size, country risk), while the most significant individual specific factors (e.g. loss of a key person, ESG-related risks) are addressed separately as adjustment factors to the estimated value.

This approach is aligned with EVS-BV (which emphasises documentation and flexibility), IVS 105 (which allows for adjustments outside the discount rate), and the OECD Transfer Pricing Guidelines (which recommend direct assessment of specific functions and risks).

Recommendations for Practice

In the case of a stable company with sufficient market data, all risks may be incorporated into the discount rate. However, when valuing companies without reliable market information—such as early-stage ventures—it is recommended to apply corrections for specific risks after the DCF model has been used.

For digital assets, platform-based business models, artificial intelligence (AI)-driven firms, and ESG or other unregulated factors, in addition to applying corrections outside the discount rate, the use of scenario-based analysis is also recommended. Finally, during investor negotiations, adjustments should be explicitly separated from the discount rate to ensure full transparency and avoid obscuring critical valuation elements.

6. Discussion on adjustment factors

Technological advancement is leading to new business models, data-related challenges, and a need for rapid valuation. This evolution requires either the adaptation of traditional valuation models or the introduction of new methodologies.

To improve the valuation of digital assets, there is a growing need to establish clear methodological frameworks and valuation standards through cooperation between professional bodies and regulatory institutions. The valuation process will increasingly require the involvement of multidisciplinary teams, including finance professionals, IT specialists, legal experts, and data analysts.

The application of dynamic valuation models will become increasingly essential, as they support the integration of large datasets, (AI), and scenario planning.

It will also be necessary to develop tools for quantifying intangible factors such as user experience and ESG impact.

Valuers will need to actively monitor regulatory changes and align their valuations with current legal and ethical standards.

Finally, continuous education and upskilling of valuation professionals in the fields of digital economy and emerging technologies will be crucial for maintaining relevance and competence in this evolving area.

7. Conclusion

Traditional valuation models are insufficient for addressing the complex and evolving environment in which modern businesses operate. The integration of digital assets and ESG factors can significantly affect valuation outcomes.

The most effective approach involves a hybrid framework that incorporates scenario analysis, real options, direct value adjustments, ESG considerations, and advanced analytics into conventional market and financial models.

Findings from this research highlight the urgent need for the development of standardised methodologies for quantifying digital and ESG-related assets. They also emphasise the importance of building digital platforms and tools for integrated valuation processes.

There is a pressing need to educate valuers and financial analysts through modern training programmes, with a focus on new digital and sustainability-driven variables.

Furthermore, regulatory frameworks must evolve to formally recognise digital and ESG variables as key determinants of enterprise value.

Future research should focus on integrating AI in automated business valuation, developing regional standards for valuing digital assets and assessing enterprise resilience to ESG and technological shocks.

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