

# The Curious Case of Brazilian Valuation Engineers

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**Abstract.** In Brazil the valuation of real property is regarded as belonging to the field of engineering. According to ABNT NBR 14653-1 the *engenheiro de avaliações* is defined as a professionally trained university graduate who is registered with CREA, and CONFEA Resolution 345/1990 assigns to engineering professionals the tasks of inspection, carrying out expert examinations, carrying out valuations and deciding contested technical questions (*arbitramento*). The *corretor de imóveis*, which was established separately by law Lei 6.530/1978, possesses a technical qualification, and the broker's statutory competence is intermediation and opinions on commercialization; whether that extends to valuation was litigated between the two councils. This article examines the distinction between these two roles, the regulatory measures that establish it, and the consequent responsibility involved. It looks at the CNAI broker-appraiser register and the disagreements between the two professional councils. The article concludes that Brazil has regulated the estimation process without, however, setting up a durable foundation for value, and it compares this method with the two-value system in Germany. An appendix gives the division of responsibilities in the form of a Prolog knowledge base, each proposition referring to its main source.

**Keywords:** Brazil, valuation competence, *engenheiro de avaliações*, *corretor de imóveis*, NBR 14653, CONFEA/CREA, COFECI/CRECI, CNAI, reserved professions

## 1 An arrangement that surprises

An American appraiser who reads the Brazilian valuation standard for the first time usually stops at the definitions. There, in clause 3.19 of ABNT NBR 14653-1:2001, issued by ABNT (the Brazilian national standards body), is the person who performs a valuation:

*engenheiro de avaliações:* Profissional de nível superior, com habilitação legal e capacitação técnico-científica para realizar avaliações, devidamente registrado no Conselho Regional de Engenharia, Arquitetura e Agronomia — CREA. (Associação Brasileira de Normas Técnicas [2001](#))

A valuation engineer has a university degree, satisfies the legal, technical, and scientific qualification requirements, and is registered with the regional council of engineering, architecture, and agronomy; this position is different from that of a licensed or certified residential appraiser. The standard dates from 2001. Since Lei 12.378/2010, architects have been registered with a separate Council of Architecture and Urbanism (CAU), and CONFEA (the Federal Council of Engineering and Agronomy) and the CREAs have been the councils of engineering and agronomy only (Brasil [2010](#)).

The main difference in Brazil does not lie in the granting of the license — this practice is common internationally — but rather in where the license sits. In the United States, appraisers are licensed by the states under criteria set nationally, with federal oversight of the state programs; brokers are licensed separately and are typically paid through the transaction. By contrast, in Brazil valuation is seen as an engineering activity licensed by the same council system that licenses the engineers who design structures and public works, while brokers are subject to a different legal and professional system.

The article describes the relevant professional organizations, explains the roles and responsibilities of each, sets out the boundaries between them, looks at the associated costs, and considers the problems which the arrangement resolves or fails to resolve. While it does not claim that Brazil's method is better, it states that the Brazilian system is coherent, clearly defined, and should therefore be given careful consideration rather than be regarded as merely a local peculiarity.

## 2 The valuation engineer

The reservation does not originate in the standard. Its basis is statutory, and the council made it explicit. Lei nº 5.194 of 24 December 1966, which regulates the exercise of engineering, architecture and agronomy, lists in article 7(c) among the professional activities of those callings *estudos, projetos, análises, avaliações, vistorias, perícias, pareceres e divulgação técnica*; article 8 makes those activities the competence of natural persons legally qualified for them (Brasil 1966). Article 6(a) makes it illegal practice for an unregistered person to perform acts reserved to these professions; the statute does not list which acts those are, and CONFEA Resolution 345/1990 states that valuation is among them, as the professions' *atribuição privativa*, and declares valuations by others void (Conselho Federal de Engenharia, Arquitetura e Agronomia 1990). Valuation is named in a federal statute as a thing engineers, architects and agronomists do.

The council resolutions elaborate that grant rather than create it. The note to clause 1 of NBR 14653-1 records that under CONFEA Resolution 345 of 27 July 1990, the activities of

*vistorias, perícias, avaliações e arbitramentos relativos a bens móveis e imóveis, suas partes integrantes e pertences, máquinas e instalações industriais, obras e serviços de utilidade pública, recursos naturais e bens e direitos*

are the *atribuição privativa* — the exclusive attribution — of engineers in their several specialties, architects, agricultural engineers, geologists, geographers and meteorologists registered with the CREA (Associação Brasileira de Normas Técnicas 2001; Conselho Federal de Engenharia, Arquitetura e Agronomia 1990). A companion resolution, 218 of 29 June 1973, fixes which attributions belong to which modality of the profession (Conselho Federal de Engenharia, Arquitetura e Agronomia 1973).

The two instruments do not list quite the same acts, and the difference is worth noticing. *Arbitramento* appears in the resolution but not in article 7(c); *pareceres* — technical opinions — appear in the statute. An opinion is therefore not, in Brazilian law, something that belongs to brokerage by its nature: the engineering professions have held the power to give technical opinions since 1966. What distinguishes the two competences is not the word *opinion* but its subject matter.

The acts themselves require definition, since English has no single word for any of them. *Vistoria* is inspection: establishing a fact by detailed examination and description of its elements, without inquiring into its causes. *Perícia* is expert examination: determining the causes of an event, or the basis of a claimed right, characteristically for a court. *Avaliação* is valuation. *Arbitramento* is deciding between technically controversial alternatives, or between alternatives that turn on subjective factors (Conselho Federal de Engenharia, Arquitetura e Agronomia

1990). They are reserved together, to the same class of professionals. In the Journal's reading, they form one competence: the capacity to examine a physical thing and give a technical finding others will rely on.

Two consequences follow, and they are what give the Brazilian system its character.

The first is that the reservation runs to a *class*, not to a specialty. No single profession owns valuation. An engineer, an architect, and an agricultural engineer hold it on the same statutory footing, architects now through the CAU.

Second, the work carries an engineer's accountability. The product is a *laudo de avaliação*, and NBR 14653-2 requires it to bear the *qualificação legal completa e assinatura do(s) profissional(is) responsável(is) pela avaliação* — the complete legal qualification and signature of the professional or professionals responsible (Associação Brasileira de Normas Técnicas 2011). A *laudo* is not an opinion offered by a service provider. It is a signed technical document whose author is answerable for it to a council that can discipline him.

### 3 The real estate broker

The *corretor de imóveis* is regulated by a different instrument altogether: Lei nº 6.530 of 12 May 1978, which gave the profession its present form, and which governs COFECI and the regional CRECIs (the federal and regional councils of real estate brokers), which register and discipline it (Brasil 1978).

Two articles are relevant here. Article 2 allows entry to those holding the title of *Técnico em Transações Imobiliárias*, a secondary-level technical qualification. In contrast, clause 3.19 of NBR 14653-1 requires a university degree. This structural difference shows that the two professions are distinct by design and not equivalent paths.

Article 3 states the broker's competence:

Compete ao Corretor de Imóveis exercer a intermediação na compra, venda, permuta e locação de imóveis, podendo, ainda, opinar quanto à comercialização imobiliária. (Brasil 1978)

The broker's role covers intermediation in the purchase, sale, exchange, and letting of real property. Additionally, the broker may *opine as to real estate commercialization*. The statute uses the verb *opinar* with the object *comercialização*, granting authority to provide opinions on how a property will be marketed, but not to conduct *avaliação*.

This distinction is often lost in English, where terms like "appraisal," "valuation," "estimate," and "opinion of value" overlap, and a broker's price opinion is common and generally accepted. In Brazil, however, the two acts are assigned by separate statutes to professions with different councils, entry requirements and legal consequences. The dispute between the two councils turns on the difference between *opinar quanto à comercialização* and *avaliar*.

### 4 Where the standard draws the line

The standard clearly demonstrates the division, though this clarity is exclusionary. The term *corretor* does not appear in the Brazilian valuation standard, while *engenheiro* appears twenty-three times in Part 1 and *arquiteto* six times. The phrase *engenheiro de avaliações* appears twenty times in Part 2. The standard does not explicitly prohibit brokers; it simply omits them from its scope.

Two clauses in Part 2 establish the standard's requirements.

Clause 8.2.1.4.2 governs the adjustment factors used when comparables are adjusted factor by factor. Published factors are acceptable if issued by recognized technical bodies, or by universities or public bodies registered with CONFEA/CREA, with studies written by engineering or

architecture professionals; otherwise the valuation engineer must derive the factors and attach the method and calculations to the report.

Clause 10.1(m), already quoted, requires the *laudo* to bear the author's full legal qualification and signature.

Together, these two clauses define the process: under the engineering standard and CONFEA's rules, a Brazilian valuation report must be prepared by a registered engineering professional, use adjustment factors whose provenance the engineering system controls, and be signed by someone the council can contact if needed. This article does not address the standard's quantitative methodology, such as foundation grades, precision, sample sizes, or significance levels, as these are covered in *Toward Valuation Engineering Protocols* elsewhere in this issue. The focus here is jurisdiction: the standard specifies both the method for obtaining the valuation and who is qualified to perform it.

One additional clause significantly shapes the definition of valuation in this system. Clause 3.8 of Part 1 defines *campo de arbítrio* as

*Intervalo de variação no entorno do estimador pontual adotado na avaliação, dentro do qual pode-se arbitrar o valor do bem, desde que justificado pela existência de características próprias não contempladas no modelo.* (Associação Brasileira de Normas Técnicas 2001)

This refers to a range around the point estimate — set by Part 2 at fifteen percent on either side — within which the professional may determine the value, *provided it is justified by characteristics of the property not captured by the model* (Associação Brasileira de Normas Técnicas 2011). The standard establishes a clearly defined and justified area for professional judgment where models fall short. Including this in a national standard is notable: the range is specified, justification is required, and a qualified individual must sign the report.

## 5 The supply problem

The effectiveness of this reservation depends on the number of available professionals. COFECI justifies the CNAI track by a shortage of engineers outside the capitals; the Journal has found no count to test this.

The size of the brokerage profession reflects market demand. According to COFECI's April 2024 census, there are 404,316 registered brokers (Conselho Federal de Corretores de Imóveis 2026). No comparable count of the CREA-registered professionals who perform valuation work, or of where they practice, has been obtained. If the shortage COFECI describes exists, it does not prove that the reservation is incorrect; the same might be said of any other licensed profession, since the reservation does provide something of real value in return. Yet it would represent a cost, felt unequally across the country, and it is the reason COFECI gives for a cheaper way to address the problem within this restricted system.

## 6 The parallel track

In response, an institution was established. COFECI maintains a national register of *avaliadores de imóveis*, or broker-appraisers, supported by an accreditation system. This includes a list of *escolas credenciadas de avaliação* (accredited valuation schools), a CNAI certificate, a digital seal, and a periodic CNAI census (Conselho Federal de Corretores de Imóveis 2026). Brokers who complete an accredited course are added to the register and receive the certificate of the CNAI (the National Register of Real Estate Appraisers). The certificate adds no statutory power: every broker may already give opinions on commercialization under article 3 of Lei 6.530/1978. The Journal has not reviewed the council resolution that created this process and therefore does not identify or describe the document issued by such brokers.

Census data clarify the purpose of this track. Nationally, CNAI-registered appraisers are nine percent of registered brokers. The ten states with the most appraisers account for sixty percent of the total, while five states hold forty-three percent. However, when considering each state's proportion of brokers, the highest concentrations are not in the largest markets. Tocantins leads with twenty percent, followed by Amapá at nineteen percent (Conselho Federal de Corretores de Imóveis 2026).

It is important to clarify what this track does and does not provide. It does not expand the broker's statutory authority: Lei 6.530/1978, article 3, permits only opinions on commercialization, and completing an accredited course does not change this. The CNAI offers additional training, a credential, a register, and a specific document. Whether this approach addresses a genuine shortage or infringes on reserved responsibilities was litigated between the two councils; CONFEA's appeal to the Supreme Federal Court failed in 2012.

## 7 The councils in conflict

The dispute reached the Supreme Federal Court in 2012: in case number ARE 708.474 (an appeal against a refusal to admit an extraordinary appeal) the appellant was the Conselho Federal de Engenharia, Arquitetura e Agronomia, the respondent was the Conselho Federal de Corretores de Imóveis and the Instituto Brasileiro de Avaliações e Perícias de Engenharia (IBAPE) took part as an interested party. The case came to the Supreme Federal Court on appeal from the Tribunal Regional Federal da 1ª Região, Federal District (origin no. 2007.34.00.010591-0). On 1 October 2012 the justice assigned to the case (*relatora*), Cármen Lúcia, refused to grant leave to appeal; on 16 October 2012 the Second Panel decided unanimously to refuse the appeal to the panel against her ruling (*agravo regimental*).<sup>1</sup>

The Journal provides an account of the litigation because both the parties and the outcome are known: CONFEA was the appellant, COFECI the respondent, and IBAPE an interested party. However, the Journal will not characterize the court's ruling beyond the known outcome. Those seeking details of the court's decision should consult the written judgment (*acórdão*; STF, 2ª Turma, ARE 708.474 AgR, rel. Min. Cármen Lúcia, judged 16 Oct 2012, DJe 220, published 8 Nov 2012).

## 8 What the Brazilian answer is, and is not

It may be tempting to view the Brazilian approach as a solution to concerns about market value, specifically the criticism that a single figure set on a specific date in a volatile market is unreliable as security over ten years. However, this is not the case, as the standard makes clear. Clause 3.44 of Part 1 defines *valor de mercado* as *Quantia mais provável pela qual se negociaria voluntariamente e conscientemente um bem, numa data de referência, dentro das condições do mercado vigente* (Associação Brasileira de Normas Técnicas 2001). This refers to the most probable amount at which the asset would be voluntarily and knowingly traded at a reference date, within prevailing market conditions. This definition is as much a point-in-time, current-conditions basis as any other international standard. The Brazilian standard does not address durability; it addresses a different issue.

This distinction should be stated clearly, as the two concepts are often confused:

- **Brazil specifies the estimate.** It defines who must produce it, the data to be used, the required level of substantiation, the declared range of judgment, the responsible signatory,

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<sup>1</sup>Confirmed by consulting the Supreme Federal Court's own process record (internal no. 4292636, portal.stf.jus.br), accessed on 20 September 2026: the parties involved, the origin of the case and both of the decisions in question. The Journal has not read the reasons given for either of the decisions and therefore includes no comment on those grounds.

and the accountable council. This addresses the question of how reliable the estimate is, and on what basis.

- **Germany introduces a second basis.** This includes market value under the federal Real Property Valuation Regulation (ImmoWertV) and, in addition, *Beleihungswert*, or mortgage lending value, under the Mortgage Lending Value Regulation (BelWertV) (Bundesrepublik Deutschland 2022). This is a deliberately conservative figure intended to remain valid throughout the loan term; the EU Capital Requirements Regulation (art. 229, as amended in 2024) likewise requires prudently conservative criteria (European Parliament and Council 2024). This addresses the question of how durable the value is.

These approaches are complementary, not competitive. For further information on the second option, see *Comparison of International Valuation Standards* in this issue, which discusses the German two-value system in detail. A country may adopt both systems. Brazil has implemented the first with notable rigor; no second, durable basis of value of that kind was found in the Brazilian sources examined.

The Brazilian example does not offer a stronger basis for valuation, but instead provides a practical illustration of an issue often debated in English-speaking valuation circles: the reliability of a valuation depends on the valuer (appraiser) and the process, and can be regulated accordingly. The standard references the professional in its definitions. The statute reserves the act, and the council's resolution elaborates the reservation. The report includes a signature and legal qualification. The permissible range of judgment is specified numerically and must be justified in writing.

The associated cost, as COFECI states it, is that the profession is too small to meet national demand, and a parallel qualification has been developed to address needs unmet by the original. Neither council is entirely correct; one ensures competence and accountability, while the other addresses what it describes as a shortage that competence alone cannot resolve. This tension is not unique to Brazil; it arises wherever professional competence is reserved, and is especially evident here because Brazil has formally defined the boundary.

## A Brazilian terms

The vocabulary below is the one a reader meets in a Brazilian *laudo*. Entries with a clause number are defined in the standard and are translated from it: Associação Brasileira de Normas Técnicas (2001) for the general part and Associação Brasileira de Normas Técnicas (2011) for urban property. Entries marked *field usage* are current among Brazilian practitioners but are *not* defined in either part, and are included because they appear in reports that cite the standard — the distinction is worth preserving, since a practitioner's habit carries none of a normative definition's authority.

Quantities are deliberately absent. The grades of foundation and precision, the minimum sample sizes and the significance levels are set out in *Toward Valuation Engineering Protocols* elsewhere in this issue.

### A.1 People, bodies and documents

***engenheiro de avaliações*** *Valuation engineer.* A professional of higher education, legally qualified and technically and scientifically capable of performing valuations, duly registered with the CREA (1-3.19).

***engenharia de avaliações*** *Valuation engineering.* The body of specialized technical and scientific knowledge applied to the valuation of assets (1-3.15). The discipline, as distinct from the practitioner.

**engenharia legal** *Legal engineering*. The part of engineering operating at the technical–legal interface, covering valuations and expert work of every kind (1-3.18).

**perito, perito avaliador** *Court-appointed expert*. A function rather than a separate career: a professional already qualified in the subject, appointed to a case. *Field usage* — the standard defines the activity (*perícia*) but not the office.

**assistente técnico** *Party-appointed technical assistant*, who reviews or contests the *perito*’s work. *Field usage*.

**corretor de imóveis** *Real estate broker*. Constituted by Lei 6.530/1978 and registered with a CRECI; competent in intermediation and, further, to opine as to commercialization (Brasil 1978). The word does not occur in either part of NBR 14653.

**CNAI** *Cadastro Nacional de Avaliadores Imobiliários*, COFECI’s national register of broker-appraisers, with accredited valuation schools and a certificate behind it (Conselho Federal de Corretores de Imóveis 2026).

**CONFEA, CREA** The federal council of engineering and agronomy and its regional councils — the *sistema CONFEA/CREA*, in the standard’s own phrase (2-3.20). The register a valuation engineer belongs to.

**COFECI, CRECI** The federal council of real estate brokers and its regional councils, governed by Lei 6.530/1978 (Brasil 1978).

**entidades técnicas reconhecidas** *Recognized technical bodies*: organizations representative of valuation engineers and registered in the *sistema CONFEA/CREA* (2-3.20).

**IBAPE** *Instituto Brasileiro de Avaliações e Perícias de Engenharia*, the valuation and expert-evidence institute. A learned society, not a licensing body; it appears eleven times in Part 2.

**laudo de avaliação** *Valuation report*. A technical report drawn up by a valuation engineer in conformity with the standard, to value the asset (1-3.29). Part 2 requires it to carry the complete legal qualification and signature of the responsible professional (2-10.1(m)).

**parecer técnico** *Technical opinion*. A detailed report or technical clarification issued by a capable and *legally qualified* professional on a matter within his specialty (1-3.34). Note that the standard’s own definition carries a qualification requirement; a technical opinion is not, in this vocabulary, an unregulated statement.

**ART, RRT** The technical-responsibility filings lodged with the CREA and the CAU respectively, by which a professional records responsibility for a piece of work. *Field usage* in this article’s sources; not defined in NBR 14653.

## A.2 Value, and the bases of value

**avaliação de bens** *Valuation of assets*. Technical analysis, carried out by a valuation engineer, to identify the value of an asset, its costs, fruits and rights, and to determine indicators of the viability of its economic use, for a given purpose, situation and date (1-3.5). The definition of the act names the professional who performs it.

**valor de mercado** *Market value*. The most probable amount for which an asset would be voluntarily and knowingly traded, at a reference date, within prevailing market conditions (1-3.44).

**valor em risco** *Value at risk*. The value of the portion of the asset that is to be insured (1-3.45).

**valor patrimonial** *Patrimonial value.* The value corresponding to the totality of the assets of a natural or legal person (1-3.46).

**preço** *Price.* The amount at which a transaction in an asset, a fruit or a right is effected, or proposed to be effected (1-3.38). Distinguished from value throughout.

**custo** *Cost.* The total of the direct and indirect outlays necessary to produce, maintain or acquire an asset (1-3.9), with *custo de reprodução* (reproduction cost, before depreciation, 1-3.9.4), *custo de reedição* (reproduction cost less depreciation, having regard to the state the asset is in, 1-3.9.3) and *custo de substituição* (replacement cost, same function and similar characteristics, 1-3.9.5).

**campo de arbítrio** *Field of judgment.* The interval of variation around the point estimate adopted in the valuation, within which the value of the asset may be arbitrated, provided it is justified by the existence of particular characteristics not contemplated in the model (1-3.8). Part 2 sets its width at fifteen percent either side of the central-tendency estimate (2-8.2.1.5.1).

**liquidação forçada** *Forced liquidation.* The condition assumed where a sale is compulsory or is to occur in less than the market's average absorption period (1-3.30).

**fator de comercialização** *Marketability factor.* The ratio of an asset's market value to its reproduction or replacement cost, which may be greater or less than one (1-3.20).

**data de referência** *Reference date* — the effective date of the valuation, which appears throughout the standard, including in the definition of market value (1-3.44).

**aproveitamento eficiente** *Efficient use.* That use which is recommendable and technically possible for the location at a reference date, having regard to the actual and effective market tendency in the surroundings, among the uses permitted by law (2-3.1). The Brazilian counterpart of highest and best use, and narrower than the American term in that the market tendency of the neighborhood is written into it.

**situação paradigma** *Paradigm situation.* A hypothetical situation adopted as a reference for valuing an asset (1-3.41).

### A.3 The property and its condition

**imóvel** *Real property.* An asset consisting of land and any improvements incorporated into it; classifiable as urban or rural (1-3.25).

**benfeitoria** *Improvement.* The result of work or services carried out on an asset which cannot be removed without destruction or fracture (1-3.7), subdivided into *necessária* (indispensable to conserve the asset), *útil* (increasing or easing its use, though dispensable) and *voluptuária* (for mere delight or recreation) (1-3.7.1–3.7.3).

**gleba urbanizável** *Urbanizable tract.* Land capable of receiving urban infrastructure with a view to its efficient use, by subdivision, dismemberment or development (2-3.30).

**desmembramento** *Dismemberment.* The subdivision of land into building lots using the existing road system, without opening new public ways (2-3.14).

**domínio** *Dominion.* The real right submitting property legally, absolutely and exclusively to a person's power and will (2-3.15), with *domínio direto*, *domínio útil* and *domínio pleno* distinguishing the bare and beneficial interests under *enfiteuse* — emphyteusis, a perpetual right to use another's land against a fixed annual ground rent, with no close American analogue; no new ones may be created since the 2002 Civil Code (2-3.16–3.18).

**servidão** *Easement*. A specific charge imposed on one property for the benefit of another (1-3.40); *área de servidão* is the part of the servient property directly affected (2-3.2).

**estado de conservação** *State of conservation*. The situation of an asset's physical characteristics at a given moment, as a result of the use and maintenance to which it has been subjected (2-3.21).

**depreciação** *Depreciation*. Loss of value owing to changes in an asset's state or quality (1-3.12), by *decrepitude* (natural aging under normal use), *deterioração* (inadequate use or maintenance), *mutilação* (removal of components originally present) and *obsoletismo* (technological or functional supersession) (1-3.12.1–3.12.4). *Depreciação física* is defined separately in Part 2 (2-3.12).

**idade real, idade estimada** *Actual and estimated age*: the time since construction was in fact completed, and an approximation to it drawn from the property's constructive, architectural and functional characteristics (2-3.32, 2-3.31).

**defeitos construtivos** *Construction defects*. Anomalies that may cause actual damage or threaten the user's health or safety, arising from failures of design, of service or of the material used (2-3.11).

**gabarito de altura** *Height limit* legally permitted at a given location (2-3.29).

**padrão construtivo** *Construction standard*. The quality of the improvements as determined by the design specifications, materials, workmanship and labor actually used (2-3.49); in practice keyed to regional CUB cost tables published by SINDUSCON.

**Ross–Heidecke** A depreciation scale combining age and state of conservation, widely taught and applied in Brazil. *Field usage* — the standard defines depreciation but prescribes no scale.

**matrícula** The registry folio of a property at the *cartório de registro de imóveis*, closer to a title abstract than to an assessor's parcel record. *Field usage*.

## A.4 Method, data and inference

**dado de mercado** *Market datum*. The set of information collected in the market relating to a given asset (1-3.10).

**pesquisa** *Research*. The activities of identifying, investigating, collecting, selecting, processing, analyzing and interpreting results on market data (1-3.36).

**amostra, população** *Sample and population*: a set of market data representative of a population (1-3.2), and the totality of market data in the segment to be analyzed (1-3.37).

**tratamento de dados** *Treatment of data*. The application of operations expressing, in relative terms, the differences in attributes between the market data and the property being valued (1-3.43).

**homogeneização** *Homogenization*. Treatment of observed prices by mathematical transformations expressing, in relative terms, the differences between the attributes of the market data and those of the property being valued (1-3.24).

**inferência estatística** *Statistical inference*. That part of statistics permitting conclusions about the population to be drawn from a sample (1-3.26).

**modelo, modelo de regressão** *Model*: a technical representation of reality (1-3.31); and the regression model used to represent a phenomenon on the basis of a sample (1-3.32).

**nível de significância** *Significance level*. The probability of rejecting the null hypothesis when it is true (1-3.33); the null hypothesis itself is defined at 1-3.23.

**estimativa pontual, estimativa de tendência central** *Point estimate and central-tendency estimate* (2-3.24, 2-3.23) — the figures the *campo de arbítrio* is measured around.

**códigos alocados, códigos ajustados** *Allocated and adjusted codes*: an ordered logical scale for qualitative characteristics, and a scale extracted from the sample itself by regression on dichotomous variables (2-3.7, 2-3.6).

**conciliação** *Reconciliation*. Adoption of the final value, duly justified, in the light of the results obtained where more than one method has been used (2-3.8).

**estrutura, conduta, desempenho do mercado** *Market structure, conduct and performance* — the analytical decomposition of the predominant agents, the practices they adopt to influence transactions, and the evidence of the market's evolution over a period (2-3.25, 2-3.9, 2-3.13); together the *conjuntura do mercado* (2-3.10).

## A.5 The report

**finalidade** *Intended use* — the purpose the valuation serves (sale, guarantee, accounting, insurance, expropriation and so on).

**objetivo** *Objective* — what is being estimated: market value for sale, rental value, or another basis.

**vistoria** *Inspection*. One of the acts reserved by Lei 5.194/1966 art. 7(c) and by CONFEA Resolution 345/1990 (Brasil 1966; Conselho Federal de Engenharia, Arquitetura e Agronomia 1990); the term occurs fourteen times in Part 2.

**perícia** *Expert examination*. A technical activity carried out by a professional with specific qualification, to ascertain and clarify facts, verify the state of an asset, establish the causes of an event, and value assets, their costs, fruits or rights (1-3.35).

**arbitramento** *Arbitration of value*. Reserved together with the other three acts by CONFEA Resolution 345/1990 (Conselho Federal de Engenharia, Arquitetura e Agronomia 1990); unlike them it does not appear in the list at Lei 5.194/1966 art. 7(c).

**grau de fundamentação, grau de precisão** The two independent scales a Brazilian report declares — how well founded the work is, and how tight the interval around the estimate. They are not the same thing, and a report may be well founded and imprecise where the market is noisy. The tables are in *Toward Valuation Engineering Protocols* elsewhere in this issue.

**pressupostos, ressalvas e fatores limitantes** *Assumptions, qualifications and limiting factors* — the Brazilian counterpart of the American limiting conditions.

*Note on references*. Clause numbers are given as 1-*n* for ABNT NBR 14653-1:2001 and 2-*n* for ABNT NBR 14653-2:2011. Citations are to the 2001 edition, superseded by ABNT NBR 14653-1:2019; clause numbers may differ in the current edition. Occurrence counts are of the official Portuguese texts. Translations are the Journal's; where a Brazilian institution has no American counterpart — *enfiteuse* is the clearest case — the Portuguese is left to stand rather than forced into a misleading equivalent.

## B The division of competence, as a knowledge base

### B.1 Why state it formally

The Brazilian arrangement described in this article reaches English-language readers almost entirely through secondary summary, and the summaries disagree with one another — most often by treating the *corretor de imóveis* as a kind of appraiser, which the Brazilian instruments do not.<sup>2</sup> A prose description invites the same drift. A formal statement does not: it can be queried, it can be contradicted, and each proposition in it can be made to name the clause it comes from.

The knowledge base below states the division of competence as Prolog facts and rules. Trealla is the Journal’s Prolog, and compatibility with SWI-Prolog and Scyer Prolog is maintained alongside it as a requirement; the knowledge base is accordingly plain ISO Prolog, with no construct peculiar to any one system. The fifty-one tests in `prolog/tests/test_valuation_roles.pl` pass under all three.

### B.2 The provenance gate

Nothing in the knowledge base is asserted directly. Every proposition is wrapped as

```
claim(Fact, SourceId, Status)    Status ∈ {verified, unverified}
```

and only a `verified` claim reaches the ordinary relations, through `fact/1`. *Verified* here means one thing only: the cited primary text was read. An `unverified` claim remains visible to `provisional/1` and to the audit predicates, and to nothing else.

The gate does real work in this article. Two propositions a reader might expect to find are deliberately held back from the working relations, because the sources behind them have not been read: that the agricultural engineer’s rural work is governed by NBR 14653-3; and the treatment of the court-appointed expert under the Civil Procedure Code. Each is recorded, with its citation, and each is inert. The architect’s move from the CREA system to the CAU under Lei 12.378/2010 has now been read in the statute and is verified (Brasil 2010): the knowledge base records the CAU as a third council registering the architect, while keeping the architect in the engineering council family where NBR 14653-1 and Resolution 345/1990 place the profession. The same is true of the entire United States contrast set, which is present so that the comparison can be stated as a comparison, and which no query in this appendix can reach.

The predicate `check/0` runs the structural audits together: every claim cites a declared source, every role is registered by a council and assigned to a council family, no role holds contradictory standing on one act, no act is left unassigned, and everything carries an English label.

### B.3 What the knowledge base says

The knowledge base groups the roles into two *council families* — the term is the Journal’s, not a Brazilian one, and it names which of the two federal council systems a professional is registered in and disciplined by: the CONFEA/CREA system or the COFECI/CRECI system.<sup>3</sup>

The level matters. Within the engineering council family several professions share the same reserved acts, so no single role owns *avaliação* outright; within the brokerage council family the CNAI credential adds an instrument without enlarging the statutory competence. The distinction this article is about therefore lives one level above the individual role, and the predicate that expresses it is `council_family_distinct_task/2`.

<sup>2</sup>The word *corretor* does not occur anywhere in either part of the valuation standard: zero occurrences in Associação Brasileira de Normas Técnicas (2001) and zero in Associação Brasileira de Normas Técnicas (2011).

<sup>3</sup>The standard itself speaks of the *sistema CONFEA/CREA* (Associação Brasileira de Normas Técnicas 2011, cl. 3.20), which is the same idea under a Brazilian name.

| Act                                     | Engineering | Brokerage                                    | Source                 |
|-----------------------------------------|-------------|----------------------------------------------|------------------------|
| <i>vistoria</i>                         | exclusive   | —                                            | Res. 345/1990          |
| <i>perícia</i>                          | exclusive   | —                                            | Res. 345/1990          |
| <i>avaliação</i>                        | exclusive   | contested<br>(Res. 345 art. 3;<br>litigated) | Res. 345/1990          |
| <i>arbitramento</i>                     | exclusive   | —                                            | Res. 345/1990          |
| <i>intermediação</i>                    | —           | permitted                                    | Lei 6.530/1978, art. 3 |
| <i>opinião quanto à comercialização</i> | —           | permitted                                    | Lei 6.530/1978, art. 3 |

Table 1: The division of competence as encoded in `valuation_roles.pl`. No act is held by both families; the test `no_act_crosses_the_two_families` asserts it. The engineering council family is the professions named in CONFEA Resolution 345/1990 and registered with the CREA (Conselho Federal de Engenharia, Arquitetura e Agronomia 1990); the brokerage council family is the *corretor de imóveis* and the CNAI broker-appraiser (Brasil 1978; Conselho Federal de Corretores de Imóveis 2026).

Two asymmetries in the table are worth naming. The first is that *avaliação* is the only act on which the brokerage council family is *contested* rather than merely silent — Resolution 345/1990, art. 3, declares void valuations by persons not registered with a CREA, and whether that reaches the broker was litigated between the two councils. The second is that the broker’s own statutory grant is an *opinion as to commercialization*, not a valuation: Lei 6.530/1978, art. 3 gives the *corretor de imóveis* intermediation, “*podendo, ainda, opinar quanto à comercialização imobiliária*” (Brasil 1978). Everything contested between the two councils lives in the gap between those two words.

The asymmetry of entry is encoded as well. NBR 14653-1 cl. 3.19 defines the *engenheiro de avaliações* as a professional of *nível superior*, legally qualified and registered with the CREA (Associação Brasileira de Normas Técnicas 2001); Lei 6.530/1978, art. 2 admits to the brokerage profession the holder of the title of *Técnico em Transações Imobiliárias*, a technical qualification (Brasil 1978). The test `qualification_levels_differ` holds the two apart.

## B.4 The source

```
% SPDX-License-Identifier: AGPL-3.0-or-later
% Copyright (C) 2026 William Bert Craytor. Published by The Valuation Engineer
% Journal (Pacific Vista Net). This program is free software: you can
% redistribute it and/or modify it under the terms of the GNU Affero General
% Public License as published by the Free Software Foundation, either version 3
% of the License, or (at your option) any later version. It is distributed
% WITHOUT ANY WARRANTY, without even the implied warranty of MERCHANTABILITY or
% FITNESS FOR A PARTICULAR PURPOSE; see the COPYING file beside it or
% <https://www.gnu.org/licenses/agpl-3.0.html>.

/* valuation_roles.pl -- who may value real property in Brazil, and what each
   role is actually competent to do.

Written for Vol. 1, Issue 2, Article 5, "The Curious Case of Brazilian
Valuation Engineers". The article's claim is that Brazil does not divide the
work the way an American reader expects: valuation is an engineering
attribution reserved to CREA-registered professionals, while the real estate
broker holds a separate, statutorily narrower competence. This file states
that division precisely enough to be queried and contradicted.

Entry points:

role(?Role)                                a professional role
```

|                                                |                                                                         |
|------------------------------------------------|-------------------------------------------------------------------------|
| <code>task(?Task)</code>                       | <i>a distinct professional act</i>                                      |
| <code>performs(?Role, ?Task, ?Standing)</code> | <i>Standing in {exclusive, permitted, excluded, contested}</i>          |
| <code>issues(?Role, ?Instrument)</code>        | <i>the document the role may sign</i>                                   |
| <code>distinct_task(?Role, ?Task)</code>       | <i>a task no other role in the same jurisdiction may perform at all</i> |
| <code>boundary(?TaskA, ?TaskB)</code>          | <i>two acts that are routinely confused</i>                             |
| <code>check</code>                             | <i>run every consistency rule; true if clean</i>                        |

PROVENANCE IS PART OF THE DATA. Nothing is asserted directly. Every fact is wrapped in

```

claim(Fact, SourceId, Status)    Status in {verified, unverified}

and only a verified claim reaches the ordinary relations, through fact/1.
"verified" means the editor read the cited primary text; the sources marked
so below were read on 20 September 2026 from the official ABNT PDFs held in
docs/ and from planalto.gov.br, and on 6 October 2026 from
normativos.confea.org.br (Res. 218/1973 and 345/1990) and planalto.gov.br
(Lei 12.378/2010). An unverified claim is visible to
provisional/1 and to the audit predicates, and to nothing else -- in
particular the LaTeX appendix prints only verified rows, so a recollection
cannot reach the page by accident.

This gate is why the file is worth having. The Brazilian material circulates
in English mostly as second-hand summary, and the summaries disagree. The
only cure is to record what the primary text says and to keep everything
else quarantined until someone reads the source.

Engines: Trealla (vProlog) is the Journal's official Prolog, and
compatibility with SWI-Prolog and Scryer Prolog is maintained as a
requirement, not as a convenience. The code is therefore plain ISO Prolog
with no engine-specific constructs, and all three must pass before a change
is committed; see run-tests.sh and tests/test_valuation_roles.pl. */

:- use_module(library(lists)).

:- disjointuous(claim/3).
:- disjointuous(source/3).

/* =====
SOURCES
===== */

/* source(Id, Kind, Citation) -- Kind in {standard, statute, resolution,
council_publication}. A claim may only cite an Id declared here; check/0
enforces it. */

source(nbr_14653_1, standard,
      'ABNT NBR 14653-1:2001, Avaliação de bens -- Parte 1: Procedimentos gerais (ABR 2001,
      ↪ valid from 30.05.2001, incorporating Errata 1 of JUN 2001 and Errata 2 of ABR
      ↪ 2005)').
source(nbr_14653_2, standard,
      'ABNT NBR 14653-2:2011, Avaliação de bens -- Parte 2: Imóveis urbanos').
source(lei_5194_1966, statute,
      'Lei nº 5.194, de 24 de dezembro de 1966 -- regulates the exercise of the professions
      ↪ of engineer, architect and agricultural engineer
      ↪ (planalto.gov.br/ccivil_03/leis/l5194.htm)').
source(confea_res_218_1973, resolution,
      'Resolução nº 218, de 29/06/1973, do CONFEA -- fixes the professional attributions of
      ↪ the engineer, architect and agronomist by modality').
source(confea_res_345_1990, resolution,

```

```

        'Resolução nº 345, de 27/07/1990, do CONFEA -- engenharia de avaliações and perícias
        ↳ de engenharia as activities of higher-education professionals').
source(lei_6530_1978, statute,
        'Lei nº 6.530, de 12 de maio de 1978 -- regulates the profession of Corretor de
        ↳ Imóveis (planalto.gov.br/ccivil_03/leis/l6530.htm)').
source(cofeci_site, council_publication,
        'Conselho Federal de Corretores de Imóveis, www.cofeci.gov.br, pages "Avaliadores de
        ↳ Imóveis", "Escolas Credenciadas de Avaliação", "Certificado CNAI" and "CENSO
        ↳ CNAI", consulted 20 September 2026').
source(lei_12378_2010, statute,
        'Lei nº 12.378, de 31 de dezembro de 2010 -- regulates the exercise of Architecture
        ↳ and Urbanism and creates the CAU').
source(nbr_14653_3, standard,
        'ABNT NBR 14653-3, Avaliação de bens -- Parte 3: Imóveis rurais').
source(cpc_2015, statute,
        'Lei nº 13.105, de 16 de março de 2015 (Código de Processo Civil), arts. 156 and 465
        ↳ -- the court-appointed expert').
source(uspap, standard,
        'Uniform Standards of Professional Appraisal Practice (The Appraisal Foundation)').
source(firrea_title_xi, statute,
        'Financial Institutions Reform, Recovery, and Enforcement Act of 1989, Title XI (12
        ↳ U.S.C. 3331 et seq.)').

/* =====
   THE PROVENANCE GATE
   ===== */

fact(F) :- claim(F, _, verified).

provisional(F) :- claim(F, _, unverified).

cited(F, Citation) :-
    claim(F, Id, _),
    source(Id, _, Citation).

/* =====
   ACCESSORS -- the vocabulary the article and the tests speak
   ===== */

jurisdiction(J)           :- fact(jurisdiction(J)).
role(R)                   :- fact(role(R)).
belongs_to(R, J)           :- fact(belongs_to(R, J)).
label(X, Lang, Text)      :- fact(label(X, Lang, Text)).
council(C)                 :- fact(council(C)).
registers(C, R)            :- fact(registers(C, R)).
entry_qualification(R, Level) :- fact(entry_qualification(R, Level)).
task(T)                    :- fact(task(T)).
performs(R, T, Standing)  :- fact(performs(R, T, Standing)).
instrument(I)              :- fact(instrument(I)).
issues(R, I)               :- fact(issues(R, I)).
governed_by(R, SourceId)  :- fact(governed_by(R, SourceId)).
council_family(R, F)      :- fact(council_family(R, F)).

/* =====
   JURISDICTIONS
   ===== */

claim(jurisdiction(br), nbr_14653_1, verified).
claim(jurisdiction(us), uspap, unverified).

/* =====
   BRAZIL -- the councils
   =====

```

```

Two federal council systems, each an autarquia with its own register,
discipline and jurisdiction. The article's subject is the line between
them.
===== */

claim(council(confea_crea), confea_res_345_1990, verified).
claim(label(confea_crea, en, 'Federal Council of Engineering and Agronomy and its regional
↳ councils (CONFEA/CREA)'), lei_12378_2010, verified). % renamed by art. 64

claim(council(cofeci_creci), lei_6530_1978, verified).
claim(label(cofeci_creci, en, 'Federal Council of Real Estate Brokers and its regional
↳ councils (COFECI/CRECI)'), lei_6530_1978, verified).

claim(council(cau), lei_12378_2010, verified). % art. 24
claim(label(cau, en, 'Council of Architecture and Urbanism (CAU)'), lei_12378_2010,
↳ verified).

/* =====
BRAZIL -- the roles
===== */

/* The valuation engineer. NBR 14653-1 cl. 3.19 defines the role in the
standard's own definitions: a higher-education professional, legally
qualified and technically and scientifically capable of performing
valuations, duly registered with the CREA. This single clause carries most
of the article's argument. */
claim(role(engenheiro_de_avaliacoes), nbr_14653_1, verified).
claim(belongs_to(engenheiro_de_avaliacoes, br), nbr_14653_1, verified).
claim(label(engenheiro_de_avaliacoes, pt_br, 'engenheiro de avaliações'), nbr_14653_1,
↳ verified).
claim(label(engenheiro_de_avaliacoes, en, 'valuation engineer'), nbr_14653_1, verified).
claim(registers(confea_crea, engenheiro_de_avaliacoes), nbr_14653_1, verified).
claim(entry_qualification(engenheiro_de_avaliacoes, nivel_superior), nbr_14653_1, verified).
claim(governed_by(engenheiro_de_avaliacoes, nbr_14653_1), nbr_14653_1, verified).
claim(governed_by(engenheiro_de_avaliacoes, nbr_14653_2), nbr_14653_2, verified).
claim(governed_by(engenheiro_de_avaliacoes, confea_res_218_1973), confea_res_218_1973,
↳ verified).

/* The architect. Named alongside the engineer in CONFEA Res. 345/1990 and
throughout NBR 14653-1, which occurs there six times. Registration moved
from the CREA system to the CAU under Lei 12.378/2010 (art. 24 creates the
CAU/BR and the CAUs; art. 55 moves architects registered with the CREAs to
the CAUs; art. 2(VI) keeps vistoria, pericia and avaliacao among the
architect's activities), after the standard was issued -- the standard's
text still says CREA. The statute was read on 6 October 2026, so the CAU
registration is verified. The CREA registration below is kept as what the
2001 standard states, and the architect stays in the engineering council
family, where NBR 14653-1 and Res. 345/1990 place the profession: the
council-family structure has two families, and the CAU is recorded as a
third council, not as a third family. */
claim(role(arquiteto), nbr_14653_1, verified).
claim(belongs_to(arquiteto, br), nbr_14653_1, verified).
claim(label(arquiteto, pt_br, 'arquiteto'), nbr_14653_1, verified).
claim(label(arquiteto, en, 'architect'), nbr_14653_1, verified).
claim(entry_qualification(arquiteto, nivel_superior), confea_res_345_1990, verified).
claim(registers(confea_crea, arquiteto), nbr_14653_1, verified).
claim(registers(cau, arquiteto), lei_12378_2010, verified). % arts. 24, 55
claim(governed_by(arquiteto, confea_res_218_1973), confea_res_218_1973, verified).

/* The agronomist, who carries rural property. NBR 14653-3 is the rural part;
we do not hold it, so the link to rural valuation stays unverified. */
claim(role(engenheiro_agronomo), nbr_14653_1, verified).
claim(belongs_to(engenheiro_agronomo, br), nbr_14653_1, verified).

```

```

claim(label(engenheiro_agronomo, pt_br, 'engenheiro agrônomo'), nbr_14653_1, verified).
claim(label(engenheiro_agronomo, en, 'agricultural engineer'), nbr_14653_1, verified).
claim(entry_qualification(engenheiro_agronomo, nivel_superior), confea_res_345_1990,
↳ verified).
claim(registers(confea_crea, engenheiro_agronomo), nbr_14653_1, verified).
claim(governed_by(engenheiro_agronomo, nbr_14653_3), nbr_14653_3, unverified).
claim(governed_by(engenheiro_agronomo, confea_res_218_1973), confea_res_218_1973, verified).

/* The real estate broker. Lei 6.530/1978 art. 2 admits to the profession the
holder of the title of Técnico em Transações Imobiliárias -- a technical,
secondary-level qualification, not nível superior. That asymmetry with cl.
3.19 is the structural fact, and it is why the two roles cannot simply be
merged. */
claim(role(corretor_de_imoveis), lei_6530_1978, verified).
claim(belongs_to(corretor_de_imoveis, br), lei_6530_1978, verified).
claim(label(corretor_de_imoveis, pt_br, 'corretor de imóveis'), lei_6530_1978, verified).
claim(label(corretor_de_imoveis, en, 'real estate broker'), lei_6530_1978, verified).
claim(registers(cofeci_creci, corretor_de_imoveis), lei_6530_1978, verified).
claim(entry_qualification(corretor_de_imoveis, nivel_tecnico), lei_6530_1978, verified).
claim(governed_by(corretor_de_imoveis, lei_6530_1978), lei_6530_1978, verified).

/* The broker-appraiser of the CNAI track. COFECI publishes a register of
Avaliadores de Imóveis, a list of accredited valuation schools, a CNAI
certificate and a CNAI census -- the apparatus exists and was read on the
council's own site. The resolution that created it has NOT been read; no
number is asserted here rather than guessed at. */
claim(role(corretor_avaliador_cnai), cofeci_site, verified).
claim(belongs_to(corretor_avaliador_cnai, br), cofeci_site, verified).
claim(label(corretor_avaliador_cnai, pt_br, 'corretor de imóveis avaliador (CNAI)'),
↳ cofeci_site, verified).
claim(label(corretor_avaliador_cnai, en, 'broker-appraiser on the CNAI register'),
↳ cofeci_site, verified).
claim(registers(cofeci_creci, corretor_avaliador_cnai), cofeci_site, verified).
claim(entry_qualification(corretor_avaliador_cnai, nivel_tecnico_mais_curso), cofeci_site,
↳ verified).

/* The court-appointed expert is a function, not a profession: the judge
appoints a qualified professional to it. Unverified pending a reading of
CPC arts. 156 and 465. */
claim(role(perito_judicial), cpc_2015, unverified).
claim(belongs_to(perito_judicial, br), cpc_2015, unverified).
claim(label(perito_judicial, en, 'court-appointed expert'), cpc_2015, unverified).

/* -----
council_family/2 -- which of the two federal council systems a role is
registered in and disciplined by: the CONFEA/CREA system (engineering) or
the COFECI/CRECI system (brokerage). "Council family" is the Journal's
term, not a Brazilian one; NBR 14653-2 cl. 3.20 speaks of the "sistema
CONFEA/CREA", which is the same idea.

The level matters. Within the engineering council family several
professions share the same reserved acts, and within the brokerage council
family the CNAI credential adds an instrument without enlarging the
statutory competence. So no single role owns an act outright, and
distinct_task/2 at the level of a role says less than
council_family_distinct_task/2 does.
----- */

claim(council_family(engenheiro_de_avaliacoes, engineering), confea_res_345_1990, verified).
claim(council_family(arquiteto, engineering), confea_res_345_1990, verified).
claim(council_family(engenheiro_agronomo, engineering), confea_res_345_1990, verified).
claim(council_family(corretor_de_imoveis, brokerage), lei_6530_1978, verified).

```

```

claim(council_family(corretor_avaliador_cnai, brokerage), cofeci_site, verified).

/* =====
THE TASKS
=====
CONFEA Res. 345/1990, as quoted in the note to clause 1 of NBR 14653-1,
makes four acts the ATRIBUICAO PRIVATIVA -- the exclusive attribution --
of engineers, architects, agronomists, geologists, geographers and
meteorologists registered with the CREA: vistoria, pericia, avaliacao and
arbitramento, over movable and immovable property, their integral parts
and appurtenances.

Lei 6.530/1978 art. 3 gives the broker a different competence altogether:
intermediation, "podendo, ainda, opinar quanto a comercializacao
imobiliaria". The statute grants an opinion on commercialization. It does
not grant avaliacao. Everything contested between the two councils lives
in the gap between those two words.
===== */

claim(task(vistoria), confea_res_345_1990, verified).
claim(label(vistoria, en, 'inspection: direct observation of the property to establish its
↳ condition and characteristics'), nbr_14653_1, verified).

claim(task(pericia), confea_res_345_1990, verified).
claim(label(pericia, en, 'expert examination: technical determination of disputed fact,
↳ typically for a court'), nbr_14653_1, verified).

claim(task(avaliacao), confea_res_345_1990, verified).
claim(label(avaliacao, en, 'valuation: determination of the value of an asset, its fruits and
↳ rights'), nbr_14653_1, verified).

claim(task(arbitramento), confea_res_345_1990, verified).
claim(label(arbitramento, en, 'arbitration: deciding between technically controversial
↳ alternatives, or between alternatives that turn on subjective factors'),
↳ confea_res_345_1990, verified). % art. 1(b)

claim(task(intermediacao), lei_6530_1978, verified).
claim(label(intermediacao, en, 'intermediation in the purchase, sale, exchange and letting of
↳ real property'), lei_6530_1978, verified).

claim(task(opinioao_comercializacao), lei_6530_1978, verified).
claim(label(opinioao_comercializacao, en, 'opinion as to real estate commercialization'),
↳ lei_6530_1978, verified).

/* -----
Who performs what.
----- */

/* The three core acts rest on a statute, not only on a council resolution.
Lei 5.194/1966 art. 7(c) lists "estudos, projetos, análises, AVALIAÇÕES,
VISTORIAS, PERÍCIAS, PARECERES e divulgação técnica" among the professional
activities of the engineer, architect and agronomist, and art. 8 makes the
activities of art. 7(a)-(f) the competence of natural persons legally
qualified for them; art. 6(a) makes it illegal practice for an
unregistered person to perform acts reserved to these professions, but
the statute does not list which acts those are. So the statute grants
the competence (permitted), and Res. 345/1990 states the reservation
(exclusive: "atribuição privativa"; art. 3 voids valuations by others).
Both citations are recorded, so the reader can see which authority
carries which act -- arbitramento comes from the resolution, parecer from
the statute. */
claim(performs(engenheiro_de_avaliacoes, avaliacao, permitted), lei_5194_1966, verified).
claim(performs(engenheiro_de_avaliacoes, vistoria, permitted), lei_5194_1966, verified).

```

```

claim(perform(engenheiro_de_avaliacoes, pericia, permitted), lei_5194_1966, verified).
claim(perform(arquiteto, avaliacao, permitted), lei_5194_1966, verified).
claim(perform(arquiteto, vistoria, permitted), lei_5194_1966, verified).
claim(perform(arquiteto, pericia, permitted), lei_5194_1966, verified).
claim(perform(engenheiro_agronomo, avaliacao, permitted), lei_5194_1966, verified).
claim(perform(engenheiro_agronomo, vistoria, permitted), lei_5194_1966, verified).
claim(perform(engenheiro_agronomo, pericia, permitted), lei_5194_1966, verified).

claim(task(parecer_tecnico), lei_5194_1966, verified).
claim(label(parecer_tecnico, en, 'technical opinion, as a professional activity of the
↪ engineering professions'), lei_5194_1966, verified).
claim(perform(engenheiro_de_avaliacoes, parecer_tecnico, exclusive), lei_5194_1966,
↪ verified).
claim(perform(arquiteto, parecer_tecnico, exclusive), lei_5194_1966, verified).
claim(perform(engenheiro_agronomo, parecer_tecnico, exclusive), lei_5194_1966, verified).

claim(governed_by(engenheiro_de_avaliacoes, lei_5194_1966), lei_5194_1966, verified).
claim(governed_by(arquiteto, lei_5194_1966), lei_5194_1966, verified).
claim(governed_by(engenheiro_agronomo, lei_5194_1966), lei_5194_1966, verified).

claim(perform(engenheiro_de_avaliacoes, vistoria, exclusive), confea_res_345_1990,
↪ verified).
claim(perform(engenheiro_de_avaliacoes, pericia, exclusive), confea_res_345_1990, verified).
claim(perform(engenheiro_de_avaliacoes, avaliacao, exclusive), confea_res_345_1990,
↪ verified).
claim(perform(engenheiro_de_avaliacoes, arbitramento, exclusive), confea_res_345_1990,
↪ verified).

claim(perform(arquiteto, vistoria, exclusive), confea_res_345_1990, verified).
claim(perform(arquiteto, pericia, exclusive), confea_res_345_1990, verified).
claim(perform(arquiteto, avaliacao, exclusive), confea_res_345_1990, verified).
claim(perform(arquiteto, arbitramento, exclusive), confea_res_345_1990, verified).

claim(perform(engenheiro_agronomo, vistoria, exclusive), confea_res_345_1990, verified).
claim(perform(engenheiro_agronomo, pericia, exclusive), confea_res_345_1990, verified).
claim(perform(engenheiro_agronomo, avaliacao, exclusive), confea_res_345_1990, verified).
claim(perform(engenheiro_agronomo, arbitramento, exclusive), confea_res_345_1990, verified).

/* Lei 6.530/1978 art. 3 says "Compete ao Corretor de Imoveis exercer a
intermediacao": a competence, not a reservation -- it does not say
"privativa". Intermediation is therefore `permitted', not `exclusive'.

The broker's standing on avaliacao is `contested'. Res. 345/1990 art. 3
declares valuations by persons not registered with a CREA "nulas de pleno
direito"; whether that reaches the broker was litigated between the two
councils, and CONFEA's appeal to the Supreme Federal Court (ARE 708.474)
failed in 2012. The lower-court judgment has not been read, so the KB
records the dispute rather than a winner. */
claim(perform(corretor_de_imoveis, intermediacao, permitted), lei_6530_1978, verified).
claim(perform(corretor_de_imoveis, opiniao_comercializacao, permitted), lei_6530_1978,
↪ verified).
claim(perform(corretor_de_imoveis, avaliacao, contested), confea_res_345_1990, verified).

claim(perform(corretor_avaliador_cnai, intermediacao, permitted), lei_6530_1978, verified).
claim(perform(corretor_avaliador_cnai, opiniao_comercializacao, permitted), cofeci_site,
↪ verified).
claim(perform(corretor_avaliador_cnai, avaliacao, contested), confea_res_345_1990,
↪ verified).

/* -----
The documents. The instrument is where the boundary becomes visible to a
reader: the laudo is a signed engineering document with a legally
answerable author, and NBR 14653-2 cl. 10.1(m) requires it to carry the

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"qualificacao legal completa e assinatura do(s) profissional(is)
responsavel(is) pela avaliacao". The word "corretor" appears nowhere in
either part of the standard -- 0 occurrences in Part 1, 0 in Part 2.
----- */

claim(instrument(laudo_de_avaliacao), nbr_14653_1, verified).
claim(label(laudo_de_avaliacao, en, 'valuation report, signed under the author''s full legal
↳ qualification'), nbr_14653_2, verified).
claim(issues(engenheiro_de_avaliacoes, laudo_de_avaliacao), nbr_14653_2, verified).
claim(issues(arquiteto, laudo_de_avaliacao), nbr_14653_2, verified).
claim(issues(engenheiro_agronomo, laudo_de_avaliacao), nbr_14653_2, verified).

/* CORRECTION, 20 September 2026. An earlier revision of this file recorded
an instrument `ptam' as VERIFIED against cofeci_site. That was wrong: the
council page actually read names the register ("Avaliadores de Imóveis"),
the accredited schools, the "Certificado CNAI", the appraiser's area and
the CNAI census -- and nowhere uses the term. The credential below is what
the page supports. The name and form of the work product the CNAI broker
issues have NOT been read and are therefore not asserted at all. */
claim(instrument(certificado_cnai), cofeci_site, verified).
claim(label(certificado_cnai, en, 'CNAI certificate: the credential held by a broker on the
↳ appraisers'' register'), cofeci_site, verified).
claim(issues(corretor_avaliador_cnai, certificado_cnai), cofeci_site, verified).

/* =====
THE UNITED STATES -- a contrast set, entirely unverified
-----

Present so that distinct_task/2 has something to be distinct FROM, and so
the article's opening claim (that an American reader finds the Brazilian
arrangement strange) can be stated as a comparison rather than an
assertion. Every row is unverified and therefore invisible to role/1,
performs/3 and the printed appendix until someone reads Title XI and the
AQB criteria. Do not cite any of it.
===== */

claim(role(certified_general_appraiser), firrea_title_xi, unverified).
claim(belongs_to(certified_general_appraiser, us), firrea_title_xi, unverified).
claim(label(certified_general_appraiser, en, 'certified general appraiser'), firrea_title_xi,
↳ unverified).
claim(entry_qualification(certified_general_appraiser, state_certification), firrea_title_xi,
↳ unverified).
claim(governed_by(certified_general_appraiser, uspap), uspap, unverified).

claim(role(us_real_estate_broker), firrea_title_xi, unverified).
claim(belongs_to(us_real_estate_broker, us), firrea_title_xi, unverified).
claim(label(us_real_estate_broker, en, 'real estate broker'), firrea_title_xi, unverified).

claim(task(us_appraisal), uspap, unverified).
claim(task(broker_price_opinion), firrea_title_xi, unverified).
claim(performs(certified_general_appraiser, us_appraisal, exclusive), firrea_title_xi,
↳ unverified).
claim(performs(us_real_estate_broker, broker_price_opinion, permitted), firrea_title_xi,
↳ unverified).
claim(performs(us_real_estate_broker, us_appraisal, excluded), firrea_title_xi, unverified).

/* =====
DERIVED RELATIONS
===== */

/* A role may actually do a task if it holds it exclusively or is permitted
it. "exclusive" is a statement about the reservation, not about
solitude: Res. 345/1990 reserves the four acts to a named class of
professions jointly, so several roles may share an exclusive attribution.

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    What the reservation excludes is everyone outside that class. */
may(R, T) :- performs(R, T, exclusive).
may(R, T) :- performs(R, T, permitted).

reserved(T) :- performs(_, T, exclusive).

/* distinct_task(Role, Task) -- a task this role may perform that no other
   role in the same jurisdiction may perform at all. This is the predicate
   the article's title asks about. */
distinct_task(R, T) :-
    may(R, T),
    belongs_to(R, J),
    \+ ( may(Other, T),
        Other \== R,
        belongs_to(Other, J) ).

/* council_family_distinct_task(CouncilFamily, Task) -- an act that one council system holds
   and the other cannot touch at all. This is the article's real claim.

   The setof/3 is load-bearing. Enumerating council_family(R, F), may(R, T) directly
   yields one solution per ROLE, so a four-act reservation shared by three
   engineering professions comes back twelve times. setof/3 collapses the
   pairs first, so the predicate is one solution per council family and act. */
council_family_distinct_task(F, T) :-
    setof(Fam-Act, R^(council_family(R, Fam), may(R, Act)), Pairs),
    member(F-T, Pairs),
    \+ ( may(Other, T),
        council_family(Other, G),
        G \== F ).

/* shares_task(A, B, T) -- two roles holding the same act. */
shares_task(A, B, T) :-
    may(A, T),
    may(B, T),
    A @< B.

/* barred(Role, Task) -- the role is affirmatively shut out of the task. */
barred(R, T) :- performs(R, T, excluded).

/* contested(Role, Task) -- the role's standing on the task is in dispute
   between the councils: neither held nor settled as barred. */
contested(R, T) :- performs(R, T, contested).

/* boundary(TaskA, TaskB) -- two acts routinely conflated in the secondary
   literature, which the Journal keeps apart. */
boundary(avaliacao, opiniao_comercializacao).
boundary(avaliacao, intermediacao).
boundary(pericia, vistoria).

/* confusable(RoleA, RoleB) -- two roles, on opposite sides of a boundary,
   whose outputs a lay reader mistakes for one another: B is barred from A's
   act, or its standing on it is contested. */
confusable(A, B) :-
    boundary(TA, TB),
    may(A, TA),
    may(B, TB),
    ( barred(B, TA) ; contested(B, TA) ).

/* =====
   AUDIT
   ===== */

unverified_claim(F, Id) :- claim(F, Id, unverified).

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undeclared_source(Id) :-
    claim(_, Id, _),
    \+ source(Id, _, _).

/* A role that no council registers is either an error or a bare function
(perito_judicial is the latter, and is unverified, so it does not reach
role/1). */
unregistered_role(R) :-
    role(R),
    \+ registers(_, R).

/* A role holding both an exclusive and an excluded standing on one task. */
contradictory_standing(R, T) :-
    performs(R, T, exclusive),
    performs(R, T, excluded).

/* A task nobody may perform. */
orphan_task(T) :-
    task(T),
    \+ may(_, T),
    \+ barred(_, T),
    \+ contested(_, T).

/* A role in no council family. */
role_without_council_family(R) :-
    role(R),
    \+ council_family(R, _).

/* A role with no label in English. */
unlabelled(X) :-
    ( role(X) ; task(X) ; instrument(X) ; council(X) ),
    \+ label(X, en, _).

/* check/0 -- true when the knowledge base is internally consistent. Written
to be used from a build or a commit hook, and reported on by
tests/test_valuation_roles.pl. */
check :-
    \+ undeclared_source(_),
    \+ unregistered_role(_),
    \+ contradictory_standing(_, _),
    \+ role_without_council_family(_),
    \+ orphan_task(_),
    \+ unlabelled(_).

/* dump/0 -- human-readable dump, for checking the file by eye. */
dump :-
    write('-- roles (verified only) --'), nl,
    ( role(R),
      label(R, en, L),
      write(' '), write(R), write(' '), write(L), nl,
      fail
    ; true ),
    write('-- acts each council family holds alone --'), nl,
    ( council_family_distinct_task(F, T2),
      write(' '), write(F), write(' -> '), write(T2), nl,
      fail
    ; true ),
    write('-- acts no single role holds alone (shared within a council family) --'), nl,
    ( setof(A, R3^(may(R3, A), \+ distinct_task(_, A)), Shared),
      member(T3, Shared),
      write(' '), write(T3), nl,
      fail
    ; true ).

```

```

; true ),
write('-- unverified claims --'), nl,
( unverified_claim(F, Id),
  write(' '), write(Id), write(' '), write(F), nl,
  fail
; true ).

```

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