Temporal Reasoning in Legal Systems

Publication, entry into force, application, end of validity, and the date the law is known

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Abstract

"What is the law on date *t*?" is several questions, not one. An act of the European Union is published on one date, enters into force on another, applies from a third that can differ from provision to provision and, within a provision, with the category of the regulated system or with facts such as the date a product was placed on the market, and ceases to apply on a fourth. The answer also depends on when the question is asked: an amendment can move a date of application before that date arrives. We define an applicability function over the provision, the question date, the determining facts and the date at which the law is known, and prove four properties: an index keyed on entry into force errs on every day between entry into force and application; the exposure of any temporal heuristic is the exact measure of the set of provision-days on which it disagrees with the law; no answer computed from dates alone is correct for a provision whose application depends on facts; and a system that missed an amendment without retroactive effect errs only on dates on or after the day the amendment took effect.

Against schedules encoded from the final provisions of eight EU acts, treating entry into force as application contradicts the schedules on 6.9% to 20.5% of provision-days between 2016 and 2028, ignoring provision-specific dates on up to 5.7%, and an AI Act schedule frozen before Regulation (EU) 2026/1744 on 2.0% of AI Act provision-days for Annex III systems [MEASURED]. Lawie's temporal index and the in-force check of its citation-authority predicate reported a provision as in force on all 781 test dates on which the schedules label it in force but not yet applicable, correctly about force and wrongly about application [MEASURED], and so erred on 30.8% of the 2,535 test dates [MEASURED]; staggered dates of application, transitional provisions and consolidated versions are not modelled [ABSENT]. The case study is Article 113 of the AI Act as published and as rewritten by Regulation (EU) 2026/1744. The implications hold for any system that answers questions about the law at a date: temporal metadata per provision, versions indexed by the date they became known, and refusal when the facts that determine applicability are missing.

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Evidence labels. Every material statement about Lawie carries an evidence class. [IMPLEMENTED] in source at the basis commit; [TESTED] exercised by repository tests at that commit; [MEASURED] measured by an offline experiment of this suite on the stated public or synthetic data, never a production or customer measurement; [ANALYTICAL] follows by argument from stated assumptions; [SIMULATED] output of a stated model; [EXTERNAL] checked against a cited primary source; [PROPOSED] design or protocol not built or not run; [UNVALIDATED] a hypothesis, stated as such; [ABSENT] not implemented; [BLOCKED] awaits an external owner or decision. Statements describe the source repository at the basis commit, not a deployed service: no workflow described here has a dated production acceptance, nothing is independently audited, and no statement has been reviewed by an independent human expert. This is a technical publication, not legal advice, not an offer of services and not a statement that any use of Lawie complies with any law.

Position

Intelligence is not authority. A model can recite the date on which a regulation entered into force and still tell a provider that obligations bind it years before they do. Fluency about dates is not knowledge of legal time. The authority of an answer about the law at a date comes from the final provisions of the act, read provision by provision, in the version known when the question is asked, and from an honest refusal when the facts that decide the answer are missing.

Six positions

1. **"In force" is not "applicable".** Entry into force makes an act part of the legal order; application makes its provisions bind. An index that conflates the two is wrong on every day between them. *Cost:* every provision needs its own date of application, transcribed from the act's final provisions.
2. **Application belongs to the provision, not to the act.** Acts apply in stages, and one paragraph can carry two dates. *Cost:* temporal metadata down to the level of the point.
3. **The law about a date depends on when you ask.** An amendment can move a date of application before it arrives, so every answer about a date carries the date at which the law was known, and answers about the future are provisional. *Cost:* versions indexed both by when they take effect and by when they were published, built from the amending acts, because consolidated texts have no legal effect.
4. **Some questions have no answer from dates alone.** Where application depends on the category of a system, the date a product was placed on the market or the date a contract was concluded, the correct output is a request for those facts. *Cost:* refusals, follow-up questions and lower apparent coverage.
5. **Interpretation is not a date.** Where a final provision leaves its own reach to interpretation, the question is a legal one and belongs to a person. *Cost:* gaps in automated coverage by design.
6. **Temporal error can be counted exactly.** Against the encoded schedules, the days on which any heuristic is wrong form a set whose size can be computed, not estimated. *Cost:* someone must transcribe and maintain the schedules, with verbatim quotes of the provisions that fix each date.

Where it stands

Lawie's temporal index resolves versions over half-open validity intervals [TESTED], but its EUR-Lex parser starts each version at entry into force, or on one path at publication, and leaves it open-ended [IMPLEMENTED]; dates of application that differ by provision, transitional provisions and consolidated versions are not modelled [ABSENT]. Its citation-authority predicate requires the cited version to be in force at the citation's date [TESTED], so it accepts provisions that do not yet apply [MEASURED]. The schedules against which this paper measures were transcribed for this suite with a verbatim quote for every date, and all 26 quotes were found in the official text [MEASURED]; no qualified lawyer has reviewed the benchmark labels [ABSENT]. Nothing described here is deployed in production [BLOCKED], and no independent audit or expert review exists [ABSENT].

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1 Introduction

Every legal answer is an answer about a date, usually an implicit one. "Must we notify the authority of this breach?" asks about the date of the breach. "Is our recruitment software subject to the high-risk requirements?" asks about the date from which the requirements bind its provider, and about the classification of the software. A system that answers such questions has to know not only what the law says but when each part of it binds, and on what facts that depends.

The simplest design for legal time, and the one Lawie's own index follows [IMPLEMENTED], keeps one interval per version: a version is valid from its entry into force until it is replaced. That model is right about the validity of a text and wrong about its application. In the final provisions of every act studied here, as published in the Official Journal, the general date of application follows entry into force by more than a year, in one by three years, and individual provisions apply earlier or later than the general date [EXTERNAL]. Flagging a law as "in force" and treating the flag as an answer is the temporal form of a broader error that this suite calls the confusion of intelligence with authority: a fact that is easy to retrieve is taken for the fact that decides the question.

This paper makes the decisive fact explicit and measures what happens when it is ignored.

Contributions. Section 2 separates the dates that matter and places them in the literature on temporal databases and legal informatics. Section 3 defines an applicability function with a knowledge date, proves that an entry-into-force index errs on exactly the interval between entry into force and application, shows that the exposure of a heuristic is the measure of its disagreement set, and bounds the error of a system with stale knowledge. Section 4 examines Article 113 of the AI Act before and after Regulation (EU) 2026/1744. Section 5 treats application that depends on facts, with the Data Act as the example. Section 6 reports the measured behaviour of Lawie's temporal components and the exact exposure of four heuristics, and section 7 draws the consequences for any system that answers "what is the law on date t". Section 8 states the evidence boundary.

Method. Statements about Lawie describe its source repository at the basis commit and carry evidence labels from the suite's claim register. Analytical results are propositions with stated assumptions and proofs. Empirical results come from the pre-registered LLRB-1 benchmark, run offline on eight EU acts retrieved from EUR-Lex on 26 November 2026 [MEASURED]; its temporal ground truth is computed from schedules transcribed from the acts' final provisions, each date with a verbatim quote that was found in the official text [MEASURED]. Quotations of legislation in this paper are taken from the corpus records of those texts, with white space normalised.

Scope. The paper concerns the time dimension of statutory law of the European Union. It does not treat the transposition of directives into national law, retroactivity in case law, limitation periods, or the temporal questions of contract law. It gives no legal advice: where a final provision is open to interpretation, the paper says so and does not resolve it.

2 The dates of legal time

2.1 Four dates of an act and a fifth of the reader

Publication. The date of the Official Journal issue that carries the act, written t_{pub}. Publication makes the text knowable. By itself it binds no one.

Entry into force. The date from which the act is part of the legal order, written t_{eif}. EU acts fix it in their final provisions, usually by reference to publication. The GDPR's formula is common to most of the acts studied here: "This Regulation shall enter into force on the twentieth day following that of its publication in

the Official Journal of the European Union" [1]. An amending act may choose a shorter period; Regulation (EU) 2026/1744 provides that it enters into force "on the third day following that of its publication in the Official Journal of the European Union" [2].

Application. The date from which a provision binds, written $t_{\text{app}}(s)$. It is a property of the provision, not of the act. The general rule is a single sentence, for the GDPR "It shall apply from 25 May 2018", and the derogations follow. The Digital Services Act "shall apply from 17 February 2024. However, Article 24(2), (3) and (6), Article 33(3) to (6), Article 37(7), Article 40(13), Article 43 and Sections 4, 5 and 6 of Chapter IV shall apply from 16 November 2022", the date of its entry into force [3]. In the Markets in Crypto-Assets Regulation, "By way of derogation from paragraph 2, Titles III and IV shall apply from 30 June 2024" [4]. Under the text of the Cyber Resilience Act as published in the Official Journal, it applies from 11 December 2027, but "Article 14 shall apply from 11 September 2026 and Chapter IV (Articles 35 to 51) shall apply from 11 June 2026" [5]. Application can also depend on the category of the regulated system or on facts of the case, which sections 4 and 5 examine.

End of validity. The date from which a provision no longer applies, written t_{rep}, typically fixed by a repealing provision of a later act. Article 94(1) of the GDPR reads "Directive 95/46/EC is repealed with effect from 25 May 2018", the GDPR's own date of application. The period in which the Directive applied and the period in which the Regulation applies therefore *meet*, in the sense of Allen's interval algebra: one ends exactly where the other begins, with neither gap nor overlap [6]. NIS2 repeals its predecessor in the same way, with effect from the date from which Member States must apply their transposing measures [7].

Knowledge date. The four dates above belong to an act. A fifth belongs to whoever asks: the date t_k at which the law is known. Acts are amended, and an amendment can change dates of application that have not yet arrived. An answer about the law at a date t_q is therefore an answer as known at some t_k, and two answers about the same t_q given at different t_k can both be correct.

2.2 Literature

Allen's algebra of thirteen relations between intervals supplies the vocabulary for relations between periods of force and of application [6]. Temporal databases distinguish *valid time*, when a fact is true of the modelled world, from *transaction time*, when it is current in the database, and call a relation that records both *bitemporal* [8]. Legislation needs a third time: the date from which a version is the law is a valid time, the date a system recorded it is a transaction time, and the date on which the amending act was published, from which the change could be known, decides what a diligent answer at t_k should have said. Palmirani, Governatori and Contissa separate the time in which a legal rule is in force from the times in which it is efficacious and applicable [9], the separation between t_{eif} and t_{app} that this paper makes operational. Akoma Ntoso records a document's life cycle as dated events (generation, amendment, repeal) and lets provisions refer to temporal groups that distinguish intervals of force from intervals of efficacy [10]. The concepts exist; the question here is whether a system that answers questions uses them, provision by provision, and what it costs when it does not.

2.3 The corpus

The measurements use eight EU acts retrieved from EUR-Lex on 26 November 2026, 3,028 provisions in all, whose article counts equal the acts' own [MEASURED] (table 1). Each act separates publication, entry into force and application [EXTERNAL]. NIS2 is a directive: its date is the one from which Member States must apply their transposing measures, and the benchmark treats it as the date of application, which is a simplification for a directive (section 8).

Table 1: The LLRB-1 corpus: dates as encoded from the acts' final provisions (research labels, section 8), counts from the parsed EUR-Lex renderings.

Act	CELEX	Published	In force	Applies (general)	Articles	Provisions
GDPR	32016R0679	2016-05-04	2016-05-24	2018-05-25	99	389
DORA	32022R2554	2022-12-27	2023-01-16	2025-01-17	64	267
NIS2	32022L2555	2022-12-27	2023-01-16	2024-10-18	46	199
MiCA	32023R1114	2023-06-09	2023-06-29	2024-12-30	149	751
DSA	32022R2065	2022-10-27	2022-11-16	2024-02-17	93	363
Data Act	32023R2854	2023-12-22	2024-01-11	2025-09-12	50	235
CRA	32024R2847	2024-11-20	2024-12-10	2027-12-11	71	305
AI Act	32024R1689	2024-07-12	2024-08-01	2026-08-02	113	519

3 A model of applicability

3.1 Definitions

An act A has versions $v_0, v_1, \ldots : v_0$ as published, each later one produced by an amending act. A version v has a *date of effect* $\tau(v)$, the entry into force of the act that made it, and a *date of publication* $\pi(v) \le \tau(v)$, from which it could be known.

Definition 3.1 (Governing version)**.** The versions of A known at t_k are $\mathscr{V}(t_k) = \{v : \pi(v) \le t_k\}$. The version that governs the date t_q, as known at t_k, is the version $v(t_q; t_k) \in \mathscr{V}(t_k)$ with the latest date of effect $\tau(v) \le t_q$.

A version v fixes, for each provision s and each set of facts F, a date of application $a_v(s, F)$, which is either a date or $\perp$ (the date depends on facts not in F, or on interpretation), and an end of application $e_v(s)$, a date or ∞. The facts that can matter are of the kinds the corpus contains: the category of a regulated system, the date a product was placed on the market, the date a contract was concluded, the entry into force of another law. We write $t_{\text{eif}}(s)$ for the entry into force of the act that inserted s.

Definition 3.2 (Applicability)**.** Let $v = v(t_q; t_k)$, $a = a_v(s, F)$ and $e = e_v(s)$. Then

$$\mathsf{App}(s, t_q, F, t_k) = \begin{cases} \mathsf{NIF} & \text{if } t_q < t_{\text{eif}}(s) \quad \text{(not in force)}, \\ \perp & \text{otherwise, if } a = \perp, \\ \mathsf{FNA} & \text{if } t_{\text{eif}}(s) \le t_q < a \quad \text{(in force, not yet applicable)}, \\ \mathsf{APP} & \text{if } a \le t_q < e \quad \text{(applicable)}, \\ \mathsf{END} & \text{if } t_q \ge e \quad \text{(no longer applicable)}. \end{cases}$$

The value $\perp$ is an answer, not a failure: it says that the question cannot be decided from the information given, and names what is missing. "The law as it stood on t_q" is $\mathsf{App}(s, t_q, F, t_q)$; "the law now known to apply to t_q" is $\mathsf{App}(s, t_q, F, t_k)$ with t_k today. For questions about the past the two coincide unless an amendment reached back.

Lemma 3.1 (No reach into the past)**.** *If no version published after t_q has a date of effect on or before t_q, then $\mathsf{App}(s, t_q, F, t_k) = \mathsf{App}(s, t_q, F, t_q)$ for every $t_k \ge t_q$.*

Proof. Every version in $\mathscr{V}(t_k) \setminus \mathscr{V}(t_q)$ was published after t_q and so, by assumption, takes effect after t_q; none of them can be the version with the latest date of effect on or before t_q. Hence $v(t_q; t_k) = v(t_q; t_q)$. □

For questions about the future the knowledge date matters by construction: $\mathsf{App}(s, t_q, F, t_k)$ with $t_q > t_k$ is a forecast conditional on no further amendment, and must be labelled as such. The definition uses the

versions *published* by t_k, not those *in effect* at t_k. The difference matters in the days between the publication of an amending act and its entry into force, as section 4 shows.

The benchmark computes its ground truth with the schedule in effect on its knowledge date, 26 November 2026, applied to every question date. For seven of the eight acts the schedules model a single version, and the convention coincides with definition 3.2. For the AI Act it reads the amended Article 113 back into the period before 27 July 2026. Because, in the schedules encoded from Article 113 as published and as amended, Regulation (EU) 2026/1744 changed only dates of application that had not arrived when it took effect, and moved none to a date before its own entry into force [EXTERNAL], this changes no answer about whether a provision applied before that day; it only replaces the interpretive gap that the original text left for Annex I systems (section 4) with the amended, determinate date.

3.2 What an index keyed on entry into force gets wrong

A common simplification answers every question about application with the validity of the version: $h_{\text{eif}}(s, t_q) = \mathsf{APP}$ if $t_q \geq t_{\text{eif}}(s)$, and NIF otherwise.

Proposition 3.1 (Error set of an entry-into-force index)**.** *Let s have a determinate date of application $a \geq t_{\text{eif}}(s)$ that does not change with t_q, and let $e = \infty$. The set of question dates on which h_{eif} and* App *disagree about whether s applies is exactly $[t_{\text{eif}}(s), a)$ [ANALYTICAL].*

Proof. For $t_q < t_{\text{eif}}$ both answer that s does not apply. For $t_{\text{eif}} \leq t_q < a$, h_{eif} answers APP and App answers FNA. For $t_q \geq a$ both answer that it applies. □

When the date of application changes with the governing version, the error set is $\{t_q \geq t_{\text{eif}} : t_q < a_{v(t_q;t_k)}(s, F)\}$, which is again an interval when amendments only move dates that have not yet arrived, to dates no earlier than their own entry into force. An index keyed on publication, $h_{\text{pub}}(s, t_q) = \mathsf{APP}$ if $t_q \geq t_{\text{pub}}$, errs on $[t_{\text{pub}}, a)$; on $[t_{\text{pub}}, t_{\text{eif}})$ it is wrong even about force. A heuristic that applies the act's general date $g \geq t_{\text{eif}}$ to every provision, $h_{\text{gen}}(s, t_q) = \mathsf{APP}$ if $t_q \geq \max(t_{\text{eif}}, g)$, errs on $[\min(a, g), \max(a, g))$, and it errs in both directions: where a provision applies early, as the DSA provisions quoted in section 2 do, it denies obligations that already bind; where a provision applies late, as Chapter III of the AI Act does for Annex III systems under the text of Article 113 as amended by Regulation (EU) 2026/1744 [EXTERNAL], it asserts obligations that do not yet bind.

3.3 Exposure is a measure

Definition 3.3 (Disagreement set and exposure)**.** Fix facts F, a knowledge date t_k, a set P of provisions whose dates of application are determinate under F, and a window W of days. The *disagreement set* of a heuristic h is

$$\Delta_h = \{(s, t) \in P \times W : [h(s, t) = \mathsf{APP}] \neq [\mathsf{App}(s, t, F, t_k) = \mathsf{APP}]\},$$

and its *exposure* is $\varepsilon_h = |\Delta_h|/|P \times W|$, the share of provision-days on which h is wrong about application.

Proposition 3.2 (Exposure)**.** *(i) ε_h is the probability that a question drawn uniformly at random from $P \times W$ receives a wrong answer about application from h.*

(ii) For any other distribution Q of questions over $P \times W$ the error rate is $Q(\Delta_h)$; if $0 < \varepsilon_h < 1$, then for every $r \in [0, 1]$ some Q gives error rate r.

(iii) Because App *and the heuristics above change value only at the dates the acts fix, Δ_h is, for each provision, a finite union of intervals, and $|\Delta_h|$ is computed exactly by summing their lengths; for h_{eif} it is $\sum_{s \in P} |[t_{\text{eif}}(s), a(s)) \cap W|$.*

Proof. (i) is the definition of the uniform distribution. (ii) If $0 < \varepsilon_h < 1$, both Δ_h and its complement are non-empty; the mixture of a distribution concentrated on Δ_h, with weight r, and one concentrated on its complement has error rate r. (iii) The functions involved are step functions of t whose steps lie in the finite set of dates fixed by the acts' final provisions; the expression for h_{eif} follows from proposition 3.1. □

Two consequences govern how exposure figures should be read. First, an exposure is a property of a heuristic and of the law over a window, not a prediction of the error rate users will experience: questions cluster around dates of application, which is exactly where the heuristics are wrong, and the measured error on transition-heavy test dates in section 6 is accordingly higher than any exposure. Second, the measure of the disagreement set of h_{eif} is fixed by the acts, but its share falls as the window widens: adding years in which nothing changes makes the heuristic look better without making it better. An exposure must therefore be reported with its window. The suite's window runs from 1 January 2016 to 31 December 2028.

3.4 Stale knowledge

Proposition 3.3 (Error of a stale system)**.** *Let a system answer with* $\mathsf{App}(\cdot,\cdot,\cdot,t'_k)$ *when the law is* $\mathsf{App}(\cdot,\cdot,\cdot,t_k)$*, with* $t'_k < t_k$*, and let every version published in* $(t'_k, t_k]$ *take effect after* t'_k*. Then the system's answers are correct for every question date earlier than the earliest date of effect* τ^* *of a version it missed, and can be wrong only on or after* τ^**.*

Proof. For $t_q < \tau^*$ no missed version can be the latest version in effect on t_q, so $v(t_q; t_k) = v(t_q; t'_k)$ and the answers coincide. □

A stale system is therefore wrong about the future relative to the amendment it missed, which is the part of the law a compliance plan is made for. For the AI Act, a schedule known on 1 July 2026 misses Regulation (EU) 2026/1744, in effect, by its final provisions, from 27 July 2026 [EXTERNAL]; by proposition 3.3 all its errors fall on or after that day.

4 Case study: Article 113 of the AI Act

4.1 Two texts of one article

Article 113 of the AI Act, entitled "Entry into force and application", read as published [11]:

> This Regulation shall enter into force on the twentieth day following that of its publication in the Official Journal of the European Union. It shall apply from 2 August 2026. However:
> (a) Chapters I and II shall apply from 2 February 2025;
> (b) Chapter III Section 4, Chapter V, Chapter VII and Chapter XII and Article 78 shall apply from 2 August 2025, with the exception of Article 101;
> (c) Article 6(1) and the corresponding obligations in this Regulation shall apply from 2 August 2027.

Regulation (EU) 2026/1744 of 8 July 2026, published in the Official Journal on 24 July 2026 and, by its final provisions, in force from 27 July 2026 [2][EXTERNAL], rewrote the derogations. The consolidated text of 27 July 2026 reads [12]:

> However:
> (a) Chapters I and II shall apply from 2 February 2025, with the exception of Article 5(1), first subparagraph, points (ba) and (bb), and Article 5(1a) and (1b) which shall apply from 2 December 2026;

(b) Chapter III Section 4, Chapter V, Chapter VII and Chapter XII and Article 78 shall apply from 2 August 2025, with the exception of Article 101;
(c) Chapter III, Sections 1, 2, and 3, with the exception of Article 6(5), shall apply from:
(i) 2 December 2027 as regards AI systems classified as high-risk pursuant to Article 6(2) and Annex III; and
(ii) 2 August 2028 as regards AI systems classified as high-risk pursuant to Article 6(1) and Annex I;
(d) Articles 102 to 110 shall apply from 27 July 2026.

Table 2 sets the two schedules side by side [EXTERNAL], and figure 1 shows what the change means for one requirement of Chapter III Section 2 as applied to an Annex III system. EUR-Lex records 88 modifications of the AI Act by the amending regulation, 83 of them at the level of articles [EXTERNAL].

Table 2: Dates of application as encoded from the text of Article 113 of the AI Act, as published and as amended (research labels, section 8). *As published, point (c) applies Article 6(1) "and the corresponding obligations" from 2 August 2027; which obligations correspond is a matter of interpretation, and the benchmark does not label these provisions for Annex I systems under the original text.

Provisions	**As published (2024)**	**As amended by Reg. (EU) 2026/1744**
Chapters I and II (definitions, prohibited practices)	2 February 2025	2 February 2025; new Art. 5 prohibitions 2 December 2026
Chapter III Section 4, Chapters V, VII, XII (except Art. 101), Art. 78	2 August 2025	2 August 2025
Articles 102–110 (amendments to other acts)	2 August 2026	27 July 2026
Chapter III Sections 1–3 (except Art. 6(5)), Annex III high-risk systems	2 August 2026	2 December 2027
Chapter III Sections 1–3 (except Art. 6(5)), Annex I high-risk systems	2 August 2027*	2 August 2028
All other provisions	2 August 2026	2 August 2026

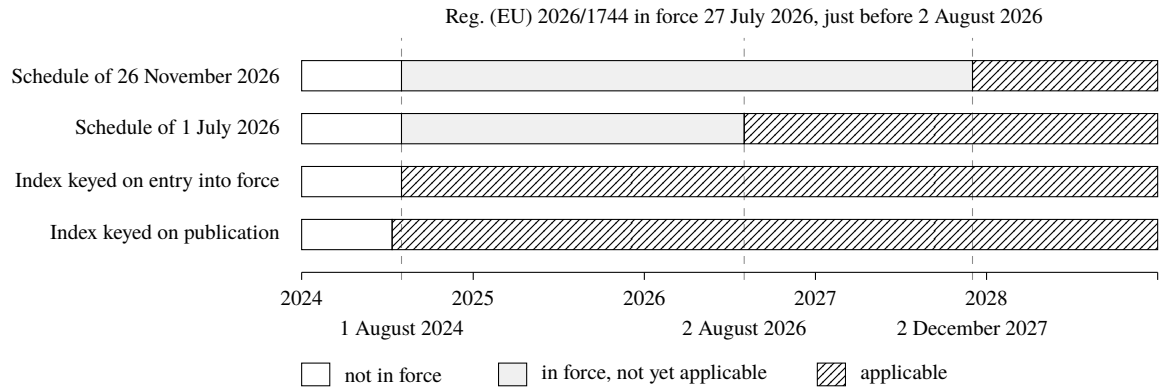

Figure 1: A requirement of Chapter III Section 2 of the AI Act (for example Article 9, risk management) for an Annex III high-risk system, 2024 to 2028: as encoded from the text of Article 113 known at two knowledge dates, and as two indexes answer. Against the amended schedule, the index keyed on entry into force is wrong from 1 August 2024 until 2 December 2027, exclusive (proposition 3.1); the schedule as known on 1 July 2026 is wrong only after the amendment took effect (proposition 3.3).

4.2 What the case shows

A fact decides the date. Under the amended point (c), the same requirement applies from 2 December 2027 or from 2 August 2028 depending on whether the system is high-risk under Article 6(2) and Annex III or under Article 6(1) and Annex I [EXTERNAL]. The classification of the system is a determining fact in the sense of definition 3.2: without it, the only correct answer is $\perp$ with a request for the classification.

Interpretation is not a date. As published, point (c) applied Article 6(1) "and the corresponding obligations" from 2 August 2027 [EXTERNAL]. Which obligations correspond to Article 6(1) is a legal question. The benchmark declines to label the affected provisions for Annex I systems under the original text rather than choose an interpretation, and a system that answered the question with a date would have made a legal judgment without saying so.

The answer depends on the knowledge date. To "from when does Article 9 apply to an Annex III system?", the schedule encoded from the text of Article 113 as known on 1 July 2026 answers 2 August 2026; the schedule encoded from the text as amended, in effect from 27 July 2026, answers 2 December 2027 (figure 1). Between the publication of the amending act on 24 July 2026 and its entry into force three days later, a system that consulted only the version in effect would still have answered 2 August 2026, although the change was published and would take effect before that date. Definition 3.1 answers 2 December 2027 from 24 July onward, because it selects versions by publication and applies them from their date of effect.

One paragraph, two dates. Amended point (a) gives Article 5(1), first subparagraph, points (ba) and (bb) the date 2 December 2026, while under the same point the rest of Article 5(1) applies from 2 February 2025. A system that holds dates per paragraph cannot represent this; the benchmark excludes Article 5(1) from its date-only items for that reason. Temporal metadata must reach the level of the point, as the addressing of Akoma Ntoso allows [10].

Amendments do not only postpone. Point (d) moved Articles 102 to 110 forward, from 2 August 2026 to 27 July 2026, the day the amending act entered into force [EXTERNAL]. A model of legal change that expects postponements will be wrong about advancements.

Unchanged text, changed law. Article 9 is not among the provisions the amending act modified, and its text is unchanged, yet the date from which, under the text of Article 113 as published and as amended, it applies to Annex III systems moved by more than a year [EXTERNAL]. A monitoring system that compares texts sees nothing in Article 9; the change lives in Article 113 and propagates through the schedule. The companion paper LL-RI-01 measures what a text-comparison engine reports for this amendment.

Consolidation is documentation. The consolidated text from which point (c) is quoted above is, in its own words, "meant purely as a documentation tool" with "no legal effect"; the authentic texts are those published in the Official Journal [EXTERNAL]. A version store that answers with legal effect must derive each version from the amending act that made it and record that act as the version's source, using consolidations as a convenience to be checked, not as the law.

5 When application depends on facts

5.1 The Data Act

Under its final provisions as published in the Official Journal, the Data Act entered into force on 11 January 2024 and applies from 12 September 2025 [EXTERNAL]. Its final provision then makes three parts of the act depend on facts that no calendar contains [13]:

> The obligation resulting from Article 3(1) shall apply to connected products and the services related to them placed on the market after 12 September 2026. Chapter III shall apply in relation to obligations to make data available under Union law or national legislation adopted in accordance with Union law, which enters into force after 12 September 2025. Chapter IV shall apply to contracts concluded after 12 September 2025. Chapter IV shall apply from 12 September 2027 to contracts concluded on or before 12 September 2025 provided that they are: (a) of indefinite duration; or (b) due to expire at least 10 years from 11 January 2024.

The design obligation of Article 3(1) attaches to products placed on the market after a date, so its application to a given product turns on that product's date of placing on the market. Chapter III turns on the date on which another law, the one that imposes a duty to make data available, entered into force. Chapter IV turns on when a contract was concluded and, for older contracts, on its duration or its expiry. From 12 September 2025 onward, two contracts that differ only in their date of conclusion can receive different answers to "does Chapter IV apply?".

Proposition 5.1 (No answer from dates alone)**.** *Suppose that for a provision s, a question date t_q and a knowledge date t_k there are two sets of facts F_1 and F_2, both consistent with the question as asked, such that* $\mathsf{App}(s, t_q, F_1, t_k)$ *and* $\mathsf{App}(s, t_q, F_2, t_k)$ *differ about whether s applies. Then every procedure whose answer depends only on (s, t_q, t_k) is wrong for F_1 or for F_2.*

Proof. Such a procedure gives the same answer under F_1 and F_2, and at most one of the two answers is correct. □

The proposition is elementary, and its consequence is strict: for a question whose facts are not given, the only answer that is never wrong is $\perp$ together with the list of facts that would decide it. A system that defaults to the general date of application answers confidently and is wrong for every product, contract or system on the other side of the condition. The benchmark excludes these provisions from its date-only items, rather than pretending that a date decides them.

5.2 Granularity and interpretation

Two further reasons force an undetermined answer, and the corpus contains both. The first is granularity. Under its text as published, MiCA applies a list of its provisions from 29 June 2023, the date of its entry into force; the list names "Article 14(1), second subparagraph" [4], so one paragraph carries two dates. A system that holds dates per paragraph cannot say when Article 14(1) applies, and the benchmark excludes that paragraph. Article 5(1) of the AI Act after Regulation (EU) 2026/1744 is the same case (section 4). The second is interpretation, as in point (c) of the original Article 113. Both are signals to route the question to a person or to a finer source of truth, not to guess.

5.3 What a determining fact is

The facts that decide application in the corpus are of four kinds: the classification of a regulated system (AI Act Annex III or Annex I), the date of a market event (placing a connected product on the market), the date and duration of a legal transaction (a contract), and the entry into force of another legal instrument (a duty to make data available). Each is a fact about the matter, not about the law, and none can be inferred from the question date. A system that answers questions about the law at a date therefore needs, for every provision, not only dates but the list of facts on which its dates depend, so that it can ask for them.

6 Measured behaviour

6.1 Lawie's temporal components

Lawie keeps legal time in two places. Its temporal index returns the version of a provision in force at a date, over half-open intervals $[from, to)$ [TESTED]; the half-open convention is the right one, since a version that ends on a day and its successor that begins on the same day must not overlap. Its EUR-Lex parser starts each version at the entry-into-force date, or on the metadata path at the effective date or else the publication date, and leaves the end open [IMPLEMENTED]. Neither the index nor the parsers model dates of application that differ by provision, transitional provisions or consolidated versions [ABSENT]. The second place is the citation-authority predicate, which, among its other conditions, requires the cited version to be in force at the citation's date [TESTED]. In the terms of section 3, both answer questions about application with h_{eif}, and on one path with h_{pub}.

6.2 The temporal family of LLRB-1

The temporal family of the benchmark asks, for a sample of provisions of each act, whether the provision applies on dates placed at every transition (the day before and the day of publication, of entry into force and of application) and on one further date drawn uniformly for about half of the provision–category pairs; AI Act items for Chapter III are asked per category of system. The test split has 2,535 items. Each Lawie component is given the versions the parser would create and asked whether the provision is in force on the date; its answer is scored as a prediction of application. Table 3 gives the result by true state.

Table 3: Errors of Lawie's temporal components by the true state of the provision on the question date (LLRB-1 test split). An answer of "in force" is scored as "applicable".

True state on the date	n	Index (entry into force)	Authority in-force check	Index (publication)
Not yet in force	1,298	0 (0%)	0 (0%)	791 (61%)
In force, not yet applicable	781	781 (100%)	781 (100%)	781 (100%)
Applicable	456	0 (0%)	0 (0%)	0 (0%)

The index keyed on entry into force and the authority predicate's in-force check reported the provision as in force on all 781 test dates on which it was in force but not yet applicable, and were correct on every other date; the variant that starts versions at publication also erred on 791 of the 1,298 dates before entry into force [MEASURED]. Over all 2,535 dates, the first two erred on 781 (30.8%, 95% CI 29.0–32.6) and the publication-keyed index on 1,572 (62.0%, 95% CI 60.1–63.9) [MEASURED]. The pattern is exactly that of proposition 3.1: every error lies in $[t_{\text{eif}}, t_{\text{app}})$ for the entry-into-force index, and in $[t_{\text{pub}}, t_{\text{app}})$ for the publication variant.

It is worth being precise about what is wrong. The index is right about force: on each of the 781 dates the provision was in force. The error lies in using force to answer a question about application, which the authority predicate does when it treats a version in force at the citation's date as an authoritative basis

for the citation [TESTED]. Taken alone, the in-force check accepts a citation of Article 9 of the AI Act for an Annex III system on every day from 1 August 2024 until 2 December 2027, exclusive, and with it an obligation that the schedule encoded from amended Article 113 labels as not yet applicable [ANALYTICAL]. Today the predicate refuses EU texts on another ground, because no span derivation for them is admitted [IMPLEMENTED]; the temporal error would surface as soon as one were. The 30.8% overall rate is a property of a test set built around transitions; it is not an estimate of the rate users would meet, which depends on the questions they ask (proposition 3.2).

6.3 Exact exposure of four heuristics

The suite also counts, for every provision of the corpus whose application the schedules determine, and for every day from 1 January 2016 to 31 December 2028, whether four heuristics agree with the schedules about application (definition 3.3). The count is exact, interval by interval, not sampled. Table 4 gives the shares.

Table 4: Exposure: share of provision-days (%) on which a heuristic contradicts the encoded schedules about application, 1 January 2016 to 31 December 2028. "From publication" and "From entry into force": validity of the act treated as application. "General date only": the act's general date applied to every provision. "Frozen before 2026/1744": the AI Act schedule as known on 1 July 2026, reported only where it gives a determinate answer on every provision-day (Annex III systems); "–" where it does not, or where the act has a single version. AI Act rows for Annex I and Annex III systems cover every provision for a system of that category; the plain AI Act row omits the provisions whose date depends on the category.

Act	From publication	From entry into force	General date only	Frozen before 2026/1744
AI Act	12.4	12.0	3.4	–
AI Act (Annex I systems)	16.1	15.7	5.7	–
AI Act (Annex III systems)	15.1	14.7	4.7	2.0
CRA	20.9	20.5	2.6	–
DORA	15.8	15.4	0.0	–
DSA	7.3	6.9	2.7	–
Data Act	13.3	12.8	0.0	–
GDPR	15.8	15.4	0.0	–
MiCA	9.9	9.4	2.1	–
NIS2	13.9	13.5	0.0	–

Three results stand out [MEASURED]. Treating entry into force as application contradicts the schedules on 6.9% (DSA) to 20.5% (CRA) of provision-days; publication as the starting point adds the twenty days between publication and entry into force. Ignoring provision-specific dates, while getting the general date right, still contradicts the schedules on up to 5.7% of provision-days, for the AI Act with Annex I systems; acts without provision-specific dates, such as the GDPR and DORA, score zero on this heuristic, as they must. And a schedule that is correct in every respect but was frozen on 1 July 2026 contradicts the current schedule on 2.0% of AI Act provision-days for Annex III systems; by proposition 3.3, every one of these errors falls on or after 27 July 2026. For the other AI Act rows no share is reported, because the frozen schedule leaves part of their provision-days undetermined; for Annex I systems, as published, it leaves the date of Chapter III Sections 1 to 3 to interpretation.

The figures depend on the window, as proposition 3.2 requires; a reader comparing them with other studies should compare disagreement sets, not percentages. The figures also bound nothing about future acts: they describe eight acts over thirteen years.

7 Implications for systems that answer "what is the law on date *t*"

The implications below hold for any such system, whether a search engine, a database, a language model with retrieval, or a compliance tool. They follow from sections 3 to 5 and do not depend on Lawie's architecture.

7.1 Temporal metadata per provision

Every addressable unit of an act, down to the point, carries its date of entry into force, its date of application or the rule that maps facts to that date, and its end of application; each date carries a verbatim quote of the provision that fixes it. The suite's schedules show that this is feasible for the acts studied: every date carries a quote, and all 26 quotes were found in the official text [MEASURED].

Consequences. Questions about application can be answered by definition 3.2 rather than by validity, and every answer can show the sentence of the act that decides it. *Assumptions.* The final provisions can be transcribed into rules over the address structure of the act; where they cannot (granularity, interpretation), the provision is marked undetermined. *Cost.* Transcription and review of the final provisions of every act, and of every amending act, by people qualified to read them; the suite's labels have not had that review [ABSENT].

7.2 Versions known at a date

Versions are stored with the date they take effect and the date they were published, and every answer states its question date, its knowledge date and the version that governs it. Answers about the future are marked provisional. Versions are derived from the amending acts, with the amending act recorded as the source; consolidated texts, which have no legal effect [EXTERNAL], serve as a check.

Consequences. A system can answer "what did the law say about this date when we decided?" and "what does it say now?" and can show why they differ. The days between the publication of an amendment and its entry into force are handled correctly (section 4). *Assumptions.* Amending acts are retrieved as they are published; the system's own record of when it learned of each version is kept, so that its knowledge at any past date can be reconstructed. *Cost.* A bitemporal store, and an ingestion process that follows the Official Journal rather than the consolidations.

7.3 Refusal when the determining facts are missing

When application depends on facts the question does not give, the system answers $\perp$, names the facts that would decide the question, and does not substitute a default. When it depends on interpretation, the system says so and routes the question to a person.

Consequences. No answer is wrong for want of facts (proposition 5.1). *Assumptions.* The fact dependencies of each provision are recorded with its dates. *Cost.* More questions to the user, fewer immediate answers, and an apparent loss of coverage that is in fact a gain in honesty.

7.4 Measurement against the encoded schedules

A system's temporal behaviour is measured by its disagreement set against schedules transcribed from the acts, reported with its window and, where possible, under a distribution of questions that resembles real use (proposition 3.2). A single accuracy figure on an unspecified sample of dates says nothing, because the heuristics are exactly right away from transitions and exactly wrong between them.

7.5 What this means for Lawie

Lawie's temporal index resolves versions over half-open intervals [TESTED]; its components hold one validity interval per version starting at entry into force or publication [IMPLEMENTED], no provision-level dates of application, no transitional provisions and no consolidated versions [ABSENT], and the index and the authority predicate's in-force check erred on all 781 test dates on which a provision was in force but not yet applicable [MEASURED]. As built, Lawie's temporal components treat a high-risk requirement of the AI Act as applicable years before the date that the schedule encoded from amended Article 113 lists. The error is structural, not a matter of data quality, and today it is masked only because no EU text passes the authority predicate on other grounds [IMPLEMENTED].

8 Evidence boundary and limitations

Evidence boundary. What was measured. The temporal family of the pre-registered LLRB-1 benchmark, run once on its test split, exercises Lawie's temporal index and the in-force check of its citation-authority predicate unchanged and offline [MEASURED]. The exposure figures are exact counts over the corpus and window stated [MEASURED]. No measurement concerns a deployed system, a customer or production data, and nothing described here is deployed in production [BLOCKED].
What the ground truth rests on. The schedules were transcribed from the acts' final provisions for this suite. Each date carries a verbatim quote that was found in the official text [MEASURED]. The schedules, and every date of entry into force or application this paper states from them, are research labels derived from the official texts; they have not been checked by a qualified lawyer [ABSENT] and are not legal advice. No independent audit or expert review of the components or of this paper exists [ABSENT]. AI-assisted drafting and internal review are not peer review.
What this paper is not. This paper reports research measurements at a stated code basis. It is not a security assurance, a compliance statement or legal advice, and no independent security, privacy or legal review of it has taken place.

Limitation. Eight acts, one language, one amendment. The corpus is English EU legislation; the only amendment modelled is Regulation (EU) 2026/1744. Corrigenda, other amendments and national law are outside it.
Directives. For NIS2 the benchmark uses the date from which Member States must apply their transposing measures as the date of application. What binds a private party is the national measure, whose dates may differ.
Provision granularity. The corpus addresses paragraphs. Provisions with sub-paragraph dates, fact-dependent application or interpretive scope were excluded from date-only items rather than modelled; the exposure figures therefore say nothing about them, and they are among the hardest cases in practice.
Distribution of questions. Exposure is uniform over provision-days; the test items concentrate on transitions. Neither is a distribution of real questions, and no study of real questions has been run.
Interpretation. Where the paper calls a final provision interpretive, it records that the text leaves a choice; it does not make the choice.

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