Precedents: Matching Frontier AI Risks to Liability Regimes

The eight frontier AI risks of the *International AI Safety Report 2026*, read against sixteen existing liability regimes

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Introduction

When a new technology causes a new kind of harm, the law rarely starts from nothing. It reaches for a regime it has used before: fault-based tort for car accidents, no-fault funds for vaccine injuries, licensing for nuclear reactors. The hard question is which one.

The Ratio Method, set out in a 2021 law review article,[1] approaches that question by breaking liability into a small set of law-and-economics variables. Every category of harm has a profile on those variables. So does every liability regime, because each regime was built for harms of a particular shape. Matching the profiles points to the precedents to build from.

The Ratio Method is a design tool, but not a formula. It describes a new risk on common dimensions and finds the regulated risks with the most similar profiles. Those regimes supply the candidate elements of a design: who is liable, the standard of liability, how victims are paid, and what is required before acting. The method recommends which elements to start from. It does not prescribe a regime wholesale. A similar profile does not guarantee that the same treatment fits. Each element still needs separate analysis of the technological, economic and institutional differences. Real regimes were also shaped by politics and timing, and none of that appears in the variables.

This report applies the method to the eight risks named in the *International AI Safety Report 2026*. In the Ratio Method a risk is always tied to an otherwise ordinary economic activity: AI content crime is a by-product of generative media tools; cyberattacks, of AI-assisted software engineering. Social value is measured for that activity, not for the harm.

The report proceeds in four parts.

- In Variables, we define the eight variables and draw each one. Frequency is split in two, because how often a harm happens and how many people it hits at once call for different legal responses.
- Precedents profiles sixteen historical regimes, from *Rylands v. Fletcher* to the SAFETY Act, on those variables, and sets out what each regime requires. Together they form a map of how the law has answered each kind of profile before.
- Matches reads each AI risk against that map, variable by variable. It reports which regime each risk most resembles, where the two part

ways, and whether the result holds when the matching is made stricter.

- Live policy tests current AI measures in the US, the EU and the frontier labs' own safety frameworks against each match.

The method in use: AI cybersecurity, 2021

The 2021 article used the method to design a liability framework for AI-driven data breaches (52 St. Mary's L.J. at 718–27). It compared a large data breach, *In re Target*, with the Deepwater Horizon oil spill. The breach reached a larger share of the US population: 34% against 16%. Its damages per person were far smaller: 0.003% of GDP per capita against 0.6%. The article argued that AI-driven breaches could close that gap. It also argued that data, like oil, is a valuable resource that does widespread harm under careless oversight. On that profile, it matched AI cybersecurity to the Oil Pollution Act of 1990.

The article then adapted the Act's elements rather than copying them.

Oil Pollution Act	2021 proposal for AI cybersecurity
The responsible party is the vessel owner or operator.	The responsible party is the "data carrier," the firm that holds and controls the data.
Liability is strict, capped by the size of the vessel.	Liability rises with culpability, judged against industry practice. The cap scales with the volume of data a network controls. The article's example is a $150 million cap for a network processing 15,000 terabytes.
The cap is lost for gross negligence or wilful misconduct.	The same rule applies.
Owners must hold a certificate of financial responsibility.	Carriers hold certificates showing they can pay for a breach, backed by data insurance.
Removal costs are uncapped and joint and several.	Server owners bear removal costs: the federal investigation, malware removal, replacing devices, recovering data and reimbursing stolen funds.

The precedent supplied the structure. Each element was then re-based for the new risk. Vessel size became data volume. Oil removal became malware removal and data recovery. This report repeats the first step for eight risks. The Live policy section then asks which elements current law already uses. For cyberattacks, oil spill liability again ties for first. No current measure uses its cap or its financial-responsibility requirement.

Variables

Eight variables describe any category of harm. Six are scales that run from near zero to extreme. Social Value 2 is a set of four categories, and Type of Harm asks three separate questions.

I. Frequency

The 2021 article treats frequency as one variable. This report splits it. Car accidents are frequent, but each one hits a person or two. A reactor accident is vanishingly rare, but hits a region at once. Spread-out losses can be pooled and insured; all-at-once losses cannot, which is why the two have historically produced different regimes.

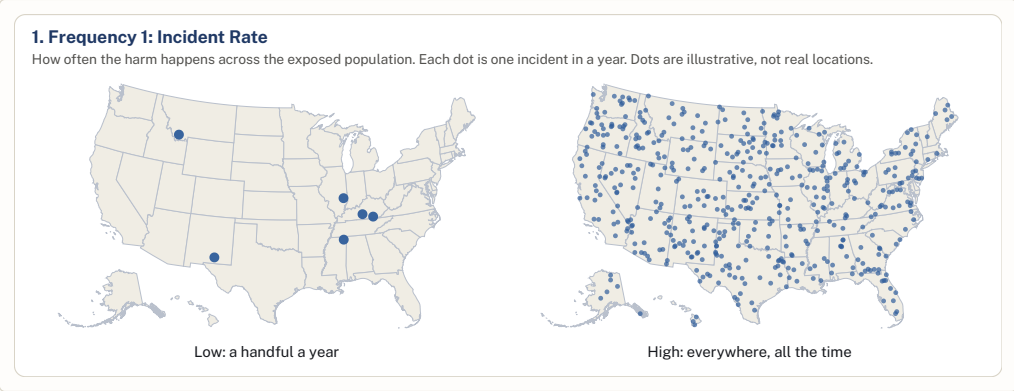


Figure 1.1: Frequency 1 measures how often the harm happens
Each dot is one incident in a year across the exposed population. The dots are illustrative and do not mark real locations.



Figure 1.2: Frequency 2 counts the people one incident hits
The same number of incidents can mean one person harmed at a time, or a whole population at once.

II. Average Damages

Average Damages measures how much each victim loses. It is expressed in terms of GDP per capita, so that an incident from 1916, from 2026, or events in different economies, can be read on the same scale.

Examples: A spam call costs a tiny fraction of a year's output. A workplace injury costs about half a year. A death costs more than a hundred.



Figure 1.3: Average Damages measures the harm to each victim
Damages are expressed against GDP per capita, so that harms from different eras and economies can be compared.

III. Social Value

Liability is a tax on an activity, so the method asks what the activity is worth. Social Value 1 is economic: what the activity adds. Social Value 2 is cultural: how society feels about the activity itself, which has historically decided whether a harmful industry is shielded or punished.

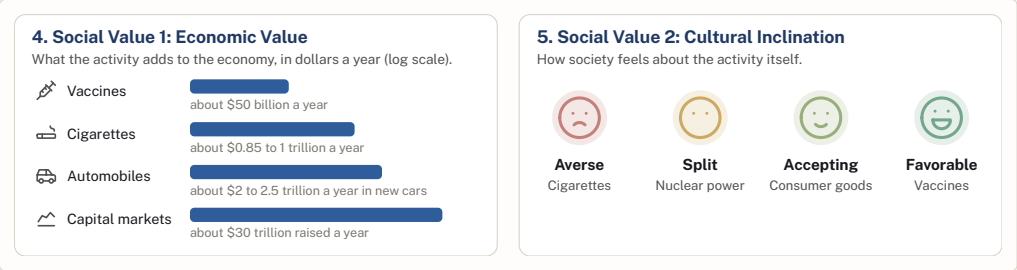


Figure 1.4: Social value has an economic form and a cultural form
Economic value is stated in dollars a year: what the activity sells or raises, not how much good it does. How society regards the activity is the separate question on the right.

IV. Type of Harm

Type of Harm records the mechanism: what kind of injury, how it reaches the victim, and when it shows up. The last mechanism in the figure, a product that acts on its own, is the one the historical regimes do not contain.



Figure 1.5: Type of Harm asks three questions
Injury, mechanism and onset are coded separately. Two harms match on this variable when at least two of the three agree. Spreading and a product acting on its own appear only in the AI risks: no historical regime has either mechanism.

V. Litigation Costs

The last two variables ask whether the courts can handle the harm at all. Litigation Costs 1 weighs the cost of finding out what happened against what the claim is worth. Litigation Costs 2 measures how hard liability is to prove once a claim is brought.

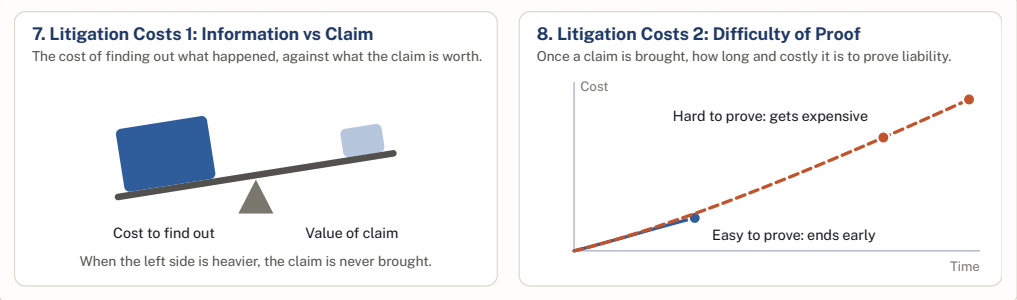


Figure 1.6: Two ways a valid claim can fail
Left: when information costs outweigh the claim, it is never brought. Right: when proof is hard, costs keep climbing after it is.

AI risks of the *International AI Safety Report 2026*

The Report groups its eight risks into three categories (Chapter 2, pp. 44–95). The section and opening page in the Report follow each risk's name.

Malicious use

AI content crime (§2.1.1, p. 45)

Underlying activity: Generative media tools (image, voice, video, text)

Risk: People use these tools to commit scams, fraud and blackmail, and to create non-consensual intimate imagery.

Influence and manipulation (§2.1.2, p. 50)

Underlying activity: AI-generated persuasive content (advertising, marketing, political messaging)

Risk: AI-generated content is used to shift people's beliefs at scale; in experiments it persuades about as well as human writing.

Cyberattacks (§2.1.3, p. 57)

Underlying activity: AI-assisted software engineering and security testing

Risk: Criminal and state-linked groups use the same capabilities to find vulnerabilities and write malicious code.

Biological and chemical risks (§2.1.4, p. 64)

Underlying activity: AI-assisted life-science and chemistry research: designing proteins and drug molecules, and editing genes with tools such as CRISPR

How AI enters: DNA and proteins are sequences, and a sequence can be read and written like code. Models trained on them can propose gene edits and new designs on a computer before anything reaches a lab. In chemistry, models built to screen drug candidates for safety can be pointed the other way, toward toxicity.

Risk: The same models, along with general-purpose assistants that hold expert-level laboratory knowledge, can give novices help toward biological or chemical weapons, such as engineered pathogens or nerve agents.

Malfunctions

Reliability failures (§2.2.1, p. 71)

Underlying activity: AI assistants and agents for professional and everyday tasks

Risk: Systems fabricate facts, write flawed code and give misleading advice, often with no one positioned to catch the error.

Loss of control (§2.2.2, p. 76)

Underlying activity: Development and deployment of highly autonomous frontier AI

Risk: A system comes to operate outside anyone's control with no clear way back; the Report finds current systems cannot yet do this (§2.2.2, p. 76).

Systemic risks

Labour market (§2.3.1, p. 84)

Underlying activity: Automation of cognitive work by employers

Risk: Workers lose jobs and wages to automation, with early signs among early-career workers in exposed occupations.

Human autonomy (§2.3.2, p. 89)

Underlying activity: Consumer AI assistants and companion apps

Risk: Routine reliance weakens critical thinking and breeds uncritical trust in what the system says.

Precedents

Sixteen regimes, in five groups, ordered from the least to the most departure from ordinary tort. Each is tied to the economic activity it governs. The profiles are retrospective readings: legislatures and courts were not reasoning in these variables, and politics shaped every regime listed. The last two columns show whether a regime caps or pools liability, and what it requires before acting; these are the elements the Live policy section turns on. Each regime's full legal elements are in the Appendix.

Regime	Underlying activity	What the regime does	Cap, fund or insurance	Required before acting
Group 1. Ordinary tort.				
Abnormally dangerous activity *(Rylands, 1868)*	Hazardous land use: reservoirs, blasting, storing explosives.	Strict liability on the actor	None.	None.
Strict products liability *(Greenman, 1963; §402A, 1965)*	Mass manufacture and sale of consumer goods.	Strict liability on the manufacturer	None federally; some states cap non-economic damages.	None under the doctrine itself.
Market-share liability *(Sindell, 1980)*	Prescription drug manufacturing: DES, sold by roughly 200 firms.	Liability by market share	Each maker's exposure is limited to its share.	None.
Group 2. Aggregation of claims.				
Fraud-on-the-market class action *(Basic, 1988)*	Issuing and trading public securities.	Presumption + class aggregation	None; the 1995 securities reform act limits pleading and the measure of damages.	Mandatory disclosure: registration and periodic reports.
Statutory damages/public enforcer *(FTC Act, 1914; TCPA, 1991)*	Telemarketing and mass consumer marketing.	Fixed damages; agency sues	None; damages are fixed per violation.	Consent rules and the Do Not Call registry.
Tobacco Master Settlement *(1998)*	Manufacture and sale of cigarettes.	States recover public costs	Payments set by formula and adjusted for sales volume.	Marketing limits, including a ban on targeting youth.
CERCLA / Superfund *(1980)*	Industrial production and chemical waste disposal.	Retroactive strict liability + fund	Superfund trust fund, financed in part by excise taxes on chemicals and petroleum.	None under CERCLA; waste handling is regulated separately.
Group 3. No-fault funds.				
Workers' compensation *(Germany 1884; US 1910s)*	Industrial employment: factories, railroads, mines.	No-fault benefits, employer-funded	Employer must insure or self-insure.	Proof of insurance coverage.
Vaccine injury compensation *(1986)*	Childhood vaccine manufacture and mass immunisation.	No-fault fund; maker shielded	Trust fund financed by a $0.75 excise tax per disease covered, per dose.	FDA licensure of each vaccine.
Displacement adjustment *(TAA, 1962; WARN, 1988)*	Trade liberalisation and plant closings.	Notice, retraining, income support	Federal appropriations; TAA's authority lapsed in July 2022.	WARN: 60 days' notice before a mass layoff or plant closing.
Group 4. Catastrophic risk.				
Ex ante licensing *(FDA, NRC, FAA, Select Agent rules)*	Marketing new drugs; operating reactors; certifying aircraft and airlines; handling dangerous pathogens.	Permission before the act	None.	Approval or certification, inspection, and ongoing reporting of adverse events and incidents.
Price-Anderson (Nuclear Liability) *(1957)*	Commercial nuclear power generation.	Channeling, insurance, pool, cap	Private insurance first ($500 million per site), then a pool every reactor operator pays into after an accident; about $16 billion per incident in total.	NRC license and mandatory financial protection.
Oil spill liability *(Oil Pollution Act, 1990)*	Transporting and drilling for oil at sea.	Strict liability capped by carrier size; uncapped for gross negligence; proof of financial responsibility; trust fund	Capped by vessel size or facility type; no cap for gross negligence or breaking safety rules. Trust fund financed by a per-barrel tax.	Certificate of financial responsibility (proof of ability to pay up to the cap) and response plans.
Space Liability Convention *(1972)*	Government and commercial space launch.	Absolute liability on launching state	None in the treaty; US launch licensees must insure to a set amount, with federal indemnification above it.	National launch licensing (the FAA in the US).
Group 5. Shields.				
Intermediary immunity *(CDA s.230, 1996)*	Hosting user-generated content online.	Intermediary immune; third party liable	Not applicable.	None; good-faith moderation is protected.
SAFETY Act *(2002)*	Selling anti-terrorism and security technology.	Liability capped at insurance level	Liability capped at the insurance DHS sets.	Voluntary DHS review and designation.

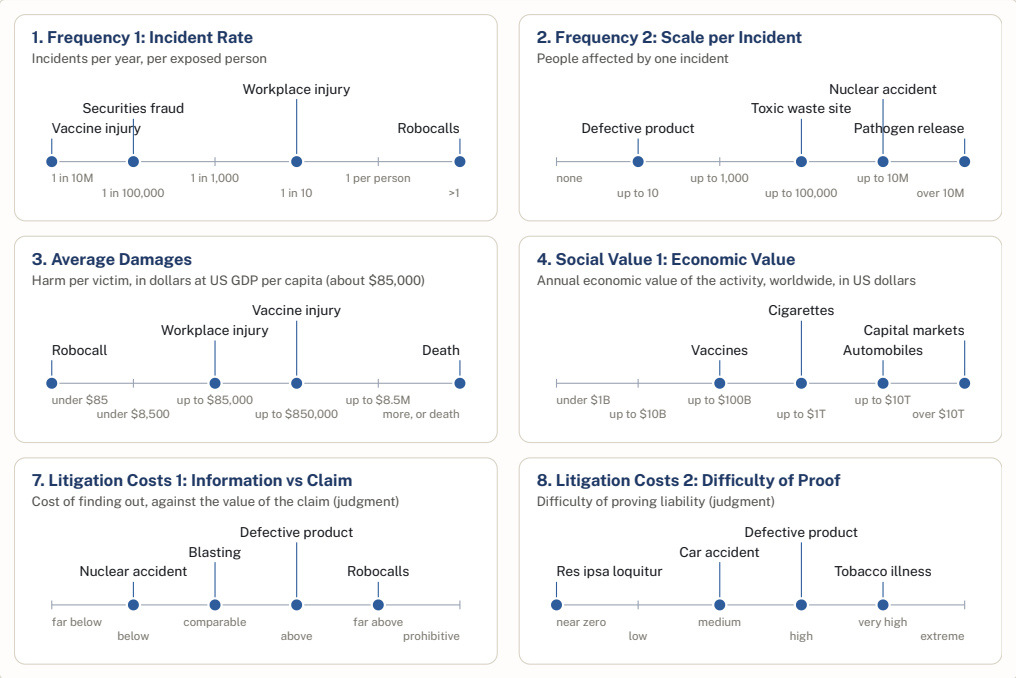


Figure 2.1: Familiar harms on each scale
The six scaled variables, each marked in its own unit, with familiar harms and doctrines placed on them. Dollar figures use a US GDP per capita of about $85,000. Scales marked judgment have no natural unit and are coded in six ordered steps.

Matches

Each risk is compared, variable by variable, against every regime. A variable matches when the two sit on the same step of its scale or one step apart. Regimes are ranked by matches minus misses, with equal weights, and every result is re-run under strict matching, where only the same step counts. The full rules are in the Appendix.

Figure 3.1, which opens below, lays every profile side by side. To see why a risk matched a regime, read the risk's row against the regime's row. Social Value 2 matches only on the same category, and Type of Harm when two of its three parts agree.

Some shapes stand out. Licensing and Price-Anderson share one: incidents near zero, high to extreme reach per incident, and the highest damages step. Biological and chemical risks and loss of control have the same shape.

▼ Show how each match is made: every profile on all eight variables

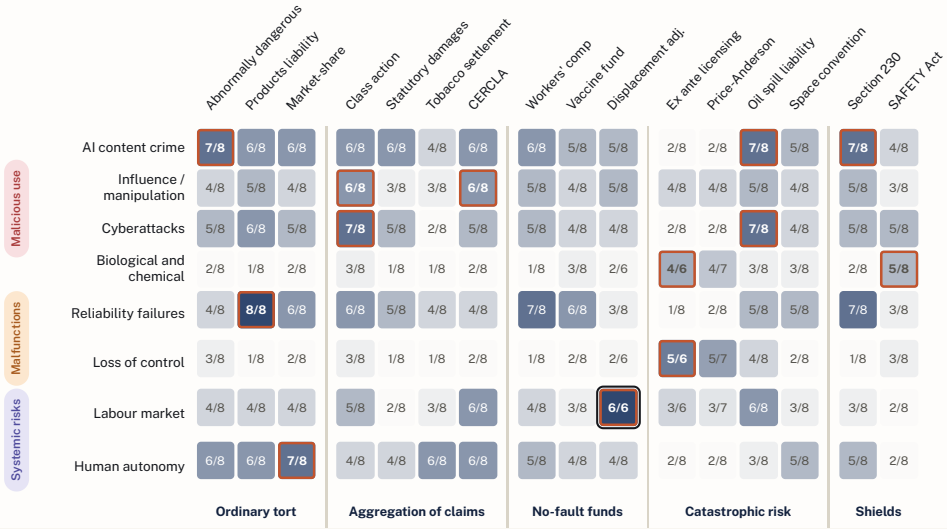
	Frequency 1 incident rate	Frequency 2 scale per incident	Average Damages per victim	Social Value 1 economic	Social Value 2 cultural	Type of Harm injury · mechanism	Litigation Costs 1 information vs claim	Litigation Costs 2 difficulty of proof
Group 1. Ordinary tort								
Abnormally dangerous	●●○○○○	●●●○○○	○○○●○○	○○●○○○	**Split** Tolerated, uncommon	physical · actor	○○●○○○	○○○●○○
Products liability	○○○●○○	○●○○○○	○○●○○○	○○○●○○	**Accepting** of mass-produced goods	physical · product	○○○●○○	○○○●○○
Market-share	○○●○○○	○●○○○○	○○○●●○	○○○●○○	**Accepting** Medicine is valued	physical · product	○○○●○○	○○○○●○
Group 2. Aggregation of claims								
Class action	●○○○○○	○○○●●○	●○○○○○	○○○●○○	**Accepting** Public investing is ordinary	financial · actor	○○○●○○	○○○○●○
Statutory damages	○○○○○●	●○○○○○	●○○○○○	○○●○○○	**Averse** Unsolicited calls are widely resented	financial, rights · actor	○○○○●○	○○●○○○

Tobacco settlement	○○○●○	○●○○○	○○○●●	○●○○○	**Averse** By 1998 public opinion had turned against smoking	physical · product	○○○●○	○○○○●
CERCLA	○○●○○	○○○●○	○○○●○	○○○●○	**Split** Industry valued, dumping feared	environmental, physical · actor	○○○●○	○○○○●
Group 3. No-fault funds								
Workers' comp	○○●○○	○●○○○	○○●○○	○○○○●	**Accepting** of industrialization	physical · actor	○○○●○	○○○○●
Vaccine fund	●○○○○	○●○○○	○○○●○	○○○○●	**Strongly favorable**	physical · product	○○○●○	○○○●○
Displacement adj.	○○●○○	○○●●○	○○●●○	○○○○●	**Split** Trade valued, closings resented	financial · actor	N/A	N/A
Group 4. Catastrophic risk								
Ex ante licensing	●○○○○	○○○●●	○○○○●	○○○●○	**Split** Valued but feared	physical · actor	N/A	N/A
Price-Anderson	●○○○○	○○○●●	○○○○●	○○○●○	**Split** The state wanted the industry	physical · actor	○●○○○	N/A
Oil spill liability	●●○○○	○○○●●	○●○○○	○○○○●	**Split** Fuel valued, spills feared	environmental, financial · actor	○○●○○	○○●○○
Space convention	●○○○○	●●○○○	○○○●○	○○○●○	**Favorable**	physical · actor	○○○●○	○○○●○
Group 5. Shields								
Section 230	○○○○●	○●○○○	○●○○○	○○○○●	**Strongly favorable** (speech)	financial, rights · third party	○○○●○	○○○●○
SAFETY Act	●○○○○	○○○●○	○○○○●	○○○●○	**Favorable**	physical · third party	○●○○○	○●○○○
AI risks, International AI Safety Report 2026								
AI content crime	○○●●○	○●○○○	○●●○○	○○○●○	**Split** Popular; contested over deepfakes and creators' rights	financial, rights · third party	○○○●○	○○○●○
Influence / manipulation	○●●○○	○○○○●	●●○○○	○○○●○	**Split** Persuasion is ordinary and protected; AI-made persuasion is distrusted	rights · third party	○○○○●	○○○○●
Cyberattacks	○○●○○	○○○○●	○●●○○	○○○●○	**Accepting** of automated coding and security tools	financial · third party	○○○●○	○○●○○
Biological and chemical	●○○○○	○○○●●	○○○○●	○○○●○	**Favorable** Medical research is strongly valued	biological, physical · spreading	N/A	N/A
Reliability failures	○○○○●	○●○○○	○●●○○	○○○○●	**Accepting** Tolerant of errors so far	financial · product	○○●○○	○○○●○
Loss of control	●○○○○	○○○○●	○○○○●	○○○●○	**Split** Wanted for productivity, feared for autonomy	financial, physical · product acts on its own	N/A	N/A
Labour market	○○●○○	○○●●○	○○●●○	○○○○●	**Split** Gains valued, job loss feared	financial · actor	N/A	N/A
Human autonomy	○○○●○	○●○○○	○●●○○	○○●○○	**Split**	psychological · product	○○○●○	○○○○●

Dots run from near zero (left) to extreme (right); more than one filled dot marks a range. Regimes in navy; AI risks in orange. Full coding and sources are in the Appendix.

Figure 3.1: How a risk matches a regime

Each row is one profile on the eight variables. Regimes are grouped as in the Precedents table; the eight AI risks follow in orange. Social Value 2 is written out with its reason, as worded in the Appendix. Type of Harm shows injury and mechanism; onset is in the Appendix.



Cell: variables matched of those compared. Darker is closer. Orange outline: closest regime for that risk. Select any cell to compare the two profiles.

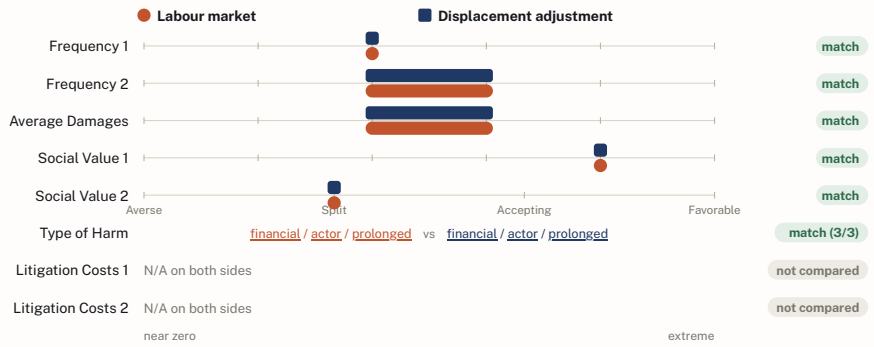


Figure 3.2: The catastrophic risks match the regimes built for catastrophe and almost nothing else
Every AI risk against every historical regime. Select a cell to see the risk (orange) against the regime (navy), variable by variable. A grey link joins the two where they match. For Type of Harm, the parts the two share are underlined.

Risk by risk

AI content crime

Underlying activity	Generative media tools: image, voice, video and text generation.
Closest regime	Three-way tie: abnormally dangerous activity; oil spill liability; intermediary immunity (s.230) *(7 of 8 each)*
Where it diverges	Abnormally dangerous activity: Type of Harm (a third party does the harm). Oil spill liability: Frequency 2. Section 230: Social Value 2.
Holds under strict matching?	No. Strict products liability leads at 6 of 8; Section 230 is second.
Output	**No stable analogue. Candidates: strict liability on the tool's provider; intermediary immunity; strict products liability.**

Influence / manipulation

Underlying activity	AI-generated persuasive content: advertising, marketing, political messaging.
Closest regime	Tie: fraud-on-the-market class action; CERCLA *(6 of 8 each)*
Where it diverges	Fraud-on-the-market: Social Value 2 and Type of Harm (no priced loss to measure). CERCLA: Average Damages and Type of Harm.
Holds under strict matching?	Partly. Fraud-on-the-market leads alone at 5 of 8.
Output	**Presumption of causation + aggregated claim, brought by a public enforcer.**

Cyberattacks

Underlying activity	AI-assisted software engineering and security testing.
Closest regime	Tie: fraud-on-the-market class action; oil spill liability *(7 of 8 each)*
Where it diverges	Class action: Litigation Costs 2 (a breach is easier to prove than reliance). Oil spill liability: Social Value 2.
Holds under strict matching?	Partly. The class action leads alone at 6 of 8; oil spill liability falls to 4 of 8.
Output	**Aggregated claims with a presumption of harm; or oil-spill-style liability: strict, capped by the carrier's size, with proof of financial responsibility and a trust fund. The second is what the 2021 article proposed.**

Biological and chemical

Underlying activity	AI-assisted biological and chemical research.
Closest regime	Tie: ex ante licensing; SAFETY Act *(4 of 6; 5 of 8)*

Where it diverges	Type of Harm on both: the harm spreads on its own, and no historical regime has that mechanism. Licensing also misses Social Value 2; the SAFETY Act misses both Litigation Costs columns, which it loses only because the risk is coded N/A there, see Limitations.
Holds under strict matching?	Yes. Licensing leads alone under strict matching.
Output	**Permission before release, with a certified liability cap for developers whose safeguards are approved.**

Reliability failures

Underlying activity	AI assistants and agents used for professional and everyday tasks.
Closest regime	Strict products liability *(8 of 8)*
Where it diverges	None under adjacent matching. One step apart on Frequency 1, Social Value 1 and Litigation Costs 1.
Holds under strict matching?	No. Section 230 leads at 6 of 8; products liability is second at 5 of 8.
Output	**Strict liability on the developer for defects. Tort generally does not compensate pure economic loss, so contract and warranty still govern most claims.**

Loss of control

Underlying activity	Developing and deploying highly autonomous frontier AI systems.
Closest regime	Ex ante licensing *(5 of 6)*
Where it diverges	Type of Harm: the product itself is the agent, which no historical regime contemplates. Litigation Costs are not compared (N/A on both sides); the N/A coding favours licensing on these two columns, see Limitations.
Holds under strict matching?	Yes.
Output	**Permission before deployment. Price-Anderson is second (5 of 7) and suggests a pool for the residual.**

Labour market

Underlying activity	Employers automating cognitive work.
Closest regime	Displacement adjustment *(6 of 6)*
Where it diverges	None on the compared columns. Litigation Costs not compared (N/A on both sides). Differs on who pays.
Holds under strict matching?	Yes.
Output	**Notice, retraining, income support, with workers' comp financing (employer-funded), per Section IV.C of the article.**

Human autonomy

Underlying activity	Consumer AI assistants and companion apps.
Closest regime	Market-share liability *(7 of 8)*
Where it diverges	Social Value 2: prescription drugs are accepted; consumer AI companions divide opinion.
Holds under strict matching?	No. The tobacco settlement and workers' compensation tie at 5 of 8; market-share liability drops to 4 of 8.
Output	**Liability shared across providers by market share. Not stable: tobacco-style recovery of public costs is the other candidate.**

Live policy

The matches say which regime each risk most resembles. This section asks whether the measures now in force, or under serious consideration, use that regime's elements. It reviews US federal and state law, EU law, and the published safety frameworks of Anthropic, OpenAI and Google DeepMind. Status is as of November 2026. Sources are listed in the Appendix.

Each assessment takes one of three forms. A match *holds* where live measures use the core elements of the matched regime. It *partly holds* where they use some of its elements and omit at least one core element. It *departs* where live measures follow a different regime.

AI risk	Matched regime	Live measures follow	Assessment
AI content crime	Short list: intermediary immunity; abnormally dangerous activity; strict products liability	Intermediary immunity, conditioned on takedown	Holds
Influence / manipulation	Fraud-on-the-market class action	An outright ban enforced by regulators	Partly holds
Cyberattacks	Fraud-on-the-market class action; oil spill liability	Breach class actions and incident reporting; no oil-spill elements	Partly holds
Biological and chemical	Ex ante licensing; SAFETY Act	Testing and reporting, without permission or a liability cap	Partly holds
Reliability failures	Strict products liability	Strict products liability (EU, from December 2026)	Holds
Loss of control	Ex ante licensing; Price-Anderson second	Testing and reporting, without permission or a pool	Partly holds
Labour market	Displacement adjustment	Layoff notice only; retraining support lapsed in 2022	Partly holds
Human autonomy	Market-share liability (not stable)	Statutory damages and public enforcers	Departs

AI content crime

Matched regime. A short list: strict liability on the tool's provider, intermediary immunity, or strict products liability.

United States. The *TAKE IT DOWN Act*, Pub. L. No. 119-12 (2025), makes it a federal crime to knowingly publish non-consensual intimate images, real or AI-generated. Since May 19, 2026, covered platforms must remove such images within 48 hours of a valid request. A failure to remove is enforced by the FTC as an unfair or deceptive practice. Platforms are not liable for removing material in good faith. The *NO FAKES Act* would create a federal right in a person's voice and likeness. It would reach both unauthorized digital replicas and tools built mainly to make them, with a notice-and-takedown safe harbor for platforms. The Senate Judiciary Committee approved it in June 2026. A request to pass it by unanimous consent failed on objection in September 2026.

European Union. Article 50 of the AI Act, Regulation (EU) 2024/1689, has applied since August 2, 2026. Providers of generative systems must mark outputs in a machine-readable form, and deployers must disclose deepfakes. Systems already on the market have until December 2, 2026 to meet the marking duty. The Digital Omnibus, Regulation (EU) 2026/1744, adds a prohibition from December 2, 2026 on AI systems that generate non-consensual intimate imagery or child sexual abuse material.

Assessment: holds. Live law adopts the intermediary-immunity candidate. Liability falls on the person who makes or shares the content. The platform keeps its protection if it removes the content on notice. Liability on the tool's provider appears only for tools built mainly for abuse.

Influence / manipulation

Matched regime. Fraud-on-the-market: a presumption of causation and an aggregated claim, brought by a public enforcer.

United States. No federal statute addresses AI persuasion as such. Section 5 of the FTC Act, 15 U.S.C. § 45, which prohibits unfair or deceptive practices, applies to AI-generated advertising as to any other.

European Union. Article 5(1)(a) of the AI Act has applied since February 2, 2025. It prohibits AI systems that deploy subliminal, purposefully manipulative or deceptive techniques. The test is whether the system materially distorts behaviour and causes, or is reasonably likely to cause, significant harm. Intent is not required. Fines reach €35 million or 7% of worldwide annual turnover, whichever is higher (Art. 99(3)). Article 5(1)(b) separately prohibits exploiting vulnerabilities due to age, disability or socio-economic situation. Under the Digital Services Act, Regulation (EU) 2022/2065, very large platforms must also assess and mitigate systemic risks to civic discourse and electoral processes (Arts. 34–35).

Frontier developers. Google DeepMind's Frontier Safety Framework tracks harmful manipulation as an exploratory critical capability. Anthropic's and OpenAI's frameworks do not list it as a tracked category.

Assessment: partly holds. The EU keeps two elements of the match: a public enforcer, and liability without proof of intent, much as fraud-on-the-market presumes reliance. It omits the third. No measure aggregates the claims of the people misled.

Cyberattacks

Matched regime. Two candidates. The first is aggregated claims with a presumption of harm. The second is oil-spill-style liability: strict, capped by the developer's size, with proof of financial responsibility and a trust fund.

United States. Data-breach claims are litigated as class actions. Since December 2023, public companies must disclose material cybersecurity incidents within four business days on Form 8-K, Item 1.05. The final rule under the *Cyber Incident Reporting for Critical Infrastructure Act of 2022* (CIRCIA) would require covered entities to report incidents within 72 hours and ransom payments within 24 hours. It went to the Office of Information and Regulatory Affairs in October 2026 and is expected in 2027.

European Union. The Cyber Resilience Act, Regulation (EU) 2024/2847, requires security by design and conformity assessment for products with digital elements, including software. Manufacturers have had to report actively exploited vulnerabilities and severe incidents since September 11, 2026. The remaining obligations apply from December 11, 2027. Under the Product Liability Directive, breach of a mandatory safety requirement supports a presumption of defect. Providers of general-purpose models with systemic risk must also ensure adequate cybersecurity protection (AI Act, Art. 55(1)(d)).

Frontier developers. OpenAI's Preparedness Framework tracks cybersecurity. In September 2026, OpenAI rated a model Critical in cyber and restricted its cyber uses to vetted defenders. Google DeepMind's framework also tracks cyber. Anthropic's Responsible Scaling Policy dropped cyber as a formal threshold in its 2026 rewrite.

Assessment: partly holds. The class-action candidate holds. Breaches are litigated in aggregate, and disclosure rules supply the facts those claims need. The oil-spill candidate has no counterpart. No measure caps a

developer's liability by size, requires proof of financial responsibility, or establishes a fund.

Biological and chemical

Matched regime. Permission before release, as in ex ante licensing, with a certified liability cap for developers whose safeguards are approved, as in the SAFETY Act.

United States. No federal permission regime exists. The *Artificial Intelligence Risk Evaluation Act*, S. 2938, 119th Cong. (2025), would establish a Department of Energy evaluation program and bar deployment of covered systems outside it. It has been before the Senate Commerce Committee since September 2025. California's *Transparency in Frontier Artificial Intelligence Act*, SB 53 (2025), has been in force since January 1, 2026. It requires large frontier developers to publish a safety framework and report critical safety incidents to the Office of Emergency Services. It does not require approval. New York's *RAISE Act*, as amended in March 2026, takes effect on January 1, 2027 on similar terms. California's SB 813 began as a certification scheme that would have given audited developers a rebuttable presumption of reasonable care. The enacted version (Cal. Stats. 2026, ch. 179) dropped the presumption. An audit is now relevant to a claim of harm but not conclusive.

European Union. Since August 2, 2025, providers of general-purpose models with systemic risk must evaluate their models, including adversarial testing, assess and mitigate systemic risks, and report serious incidents to the AI Office (AI Act, Art. 55). Models trained with more than 10^{25} floating-point operations are presumed to carry systemic risk (Art. 51). Since August 2, 2026, the Commission can request information, evaluate models, and require restriction, withdrawal or recall. Fines reach €15 million or 3% of worldwide annual turnover (Art. 101). This is supervision after release, not permission before it.

Frontier developers. All three frameworks set chemical and biological capability thresholds. Anthropic has applied its ASL-3 protections since May 2025. OpenAI restricts its most capable life-science models to vetted users.

Assessment: partly holds. The licensing element is arriving as mandatory testing and reporting, without a permission step. The SAFETY Act element was proposed in California and removed before enactment.

Reliability failures

Matched regime. Strict products liability on the developer for defects.

United States. In *Garcia v. Character Technologies, Inc.* (M.D. Fla. May 21, 2025), the court let products-liability claims proceed against a chatbot app, treating it as a product, and declined to dismiss on First Amendment grounds. The case settled in January 2026. Coordinated cases against OpenAI in California state court (*In re ChatGPT Product Liability Cases*, JCCP No. 5431) turn on the same question. OpenAI argues that ChatGPT is a service. The *AI LEAD Act*, S. 2937, 119th Cong. (2025), would create a federal cause of action against AI developers for defective design, failure to warn, breach of warranty, and strict liability. It has been before the Senate Judiciary Committee since September 2025. The *RISE Act*, S. 2081, 119th Cong. (2025), points the other way. It would shield developers from civil liability when licensed professionals use their tools, on condition that the developer publishes its model specifications.

European Union. The Product Liability Directive, Directive (EU) 2024/2853, treats software, including AI systems, as a product. Liability is strict and uncapped. Courts may order disclosure of evidence. Defect and causation may be presumed where technical complexity makes proof excessively difficult (Arts. 9–10). It applies to products placed on the market from December 9, 2026, which is also the transposition deadline. Most member states have not finished transposing it. The proposed AI Liability Directive, a fault-based complement, was withdrawn in October 2025.

Assessment: holds. The EU adopts strict products liability for AI from December 2026. US courts and bills lean the same way. The RISE Act's shield resembles Section 230, which leads under strict matching. The live debate runs between the two regimes the scorecard names.

Loss of control

Matched regime. Permission before deployment, as in ex ante licensing, with a Price-Anderson-style pool for the residual risk.

United States. No permission regime exists. SB 53 and the RAISE Act require published safety frameworks and incident reporting. The *Artificial Intelligence Risk Evaluation Act*'s evaluation program would cover loss-of-control risks; it has not moved. In June 2026, Anthropic's chief executive proposed mandatory third-party testing in four areas, including loss of control, with authority for the government to block or deter deployment. We found no introduced bill that would require liability insurance or create a compensation pool.

European Union. The duties for general-purpose models with systemic risk apply, as above. The Commission can require restriction or recall.

Frontier developers. Anthropic's Responsible Scaling Policy sets thresholds for misalignment and for automated AI research. OpenAI's Preparedness Framework tracks AI self-improvement. Google DeepMind's Frontier Safety Framework requires a safety case review before external launch, and before large internal deployments once a model reaches its machine-learning research thresholds.

Assessment: partly holds. Live measures take licensing's inspection and reporting elements. None requires permission, though the June 2026 proposal comes closest. Nothing resembles the Price-Anderson pool.

Labour market

Matched regime. Displacement adjustment: notice, retraining and income support, financed by employers, as the 2021 article proposed.

United States. The WARN Act, 29 U.S.C. §§ 2101–2109, requires 60 days' notice of a plant closing or mass layoff. It applies to AI-driven layoffs that meet its thresholds. Since March 2025, New York's WARN filings have asked whether AI contributed to a layoff. None of more than 160 filers has said yes. The *AI-Related Job Impacts Clarity Act*, S. 3108, 119th Cong. (2025), would require quarterly reporting of AI-related layoffs to the Department of Labor. It has not moved since its introduction in November 2025. Trade Adjustment Assistance for workers lapsed on July 1, 2022. Bills to reauthorize it have been introduced, but none extends it to AI displacement.

Assessment: partly holds. The notice element is live. Retraining and income support lapsed with Trade Adjustment Assistance, and no measure

requires employers to fund them.

Human autonomy

Matched regime. Market-share liability, or tobacco-style recovery of public costs. Neither is stable.

United States. California's SB 243 (2025) has been in force since January 1, 2026. Operators of companion chatbots must disclose that they are not human, maintain a suicide and self-harm protocol, and protect known minors. A person injured may recover actual damages or $1,000 per violation, whichever is greater. SB 1119 (2026), signed in September 2026, adds age assurance, risk assessments before launch, default time limits for children, and penalties of up to $15,000 per child for intentional violations. The *GUARD Act*, S. 3062, 119th Cong. (2025), would bar minors from AI companions. The Senate Judiciary Committee approved it 22–0 in April 2026. Florida's attorney general sued OpenAI in June 2026. The FTC has been studying companion chatbots under its Section 6(b) authority since September 2025.

European Union. The AI Act requires chatbots to disclose that the user is interacting with AI (Art. 50(1)). It prohibits AI that exploits vulnerabilities due to age (Art. 5(1)(b)).

Assessment: departs. Live law follows the statutory-damages and public-enforcer regime: fixed damages per violation, product rules and suits by attorneys general. Market-share liability appears nowhere. State attorney-general suits are, however, the route that led to the tobacco settlement.

Discussion

Five of the eight results hold under strict matching: manipulation, cyberattacks, biological and chemical risks, loss of control and labour market keep a leading regime when only same-step matches count. Three do not. AI content crime, reliability failures and human autonomy change their leading regime, and their outputs should be read as candidates.

Catastrophic risks. The method separates the catastrophic risks robustly. Biological and chemical risks and loss of control match licensing and the catastrophe regimes. They match nothing in ordinary tort, under every matching rule and weighting tried.

The other six risks. Here the method discriminates weakly. Eight equal-weight columns with one-step adjacency leave a three-way tie for content crime and two-way ties for manipulation and cyberattacks. Three leaders change under strict matching.

Weight sensitivity. Every ranking was re-run under six alternative weightings: Type of Harm doubled; Average Damages doubled; both doubled; both Frequency columns doubled; Litigation Costs halved; Social Value 2 dropped.

- No weighting changes the leader for the four risks that have a single one: reliability failures, loss of control, labour market and human autonomy. The closest call is reliability failures, where dropping Social Value 2 brings Section 230 level with products liability.
- For the four tied risks, the weightings break the ties in different directions, almost always toward a regime already in the tie.

- The exceptions are both for manipulation: doubling Type of Harm adds Section 230 to the tie, and halving Litigation Costs adds displacement adjustment and oil spill liability.

Reading the outputs. Weights decide between near neighbours; they do not produce new matches. For the tied risks, the output is a short list, not a selection. Even a single leader supplies elements to build from, not a regime to adopt wholesale.

Live policy. Live policy holds the match for two risks: content crime and reliability failures. It partly holds for five and departs for one. The gaps follow a pattern. For the catastrophic risks, live measures adopt licensing's testing and reporting, but not its permission. No measure pools liability the way Price-Anderson does, and California dropped the one certified liability cap on offer. The missing elements are the ones that decide who pays when a tested model still causes harm.

Tying each risk to its underlying activity moved three results. Cyberattacks tie between the class action, which is how data-breach claims are in fact litigated, and oil spill liability, which is the regime the 2021 article proposed for them: data, like oil, is a valuable resource that does region-wide harm under careless oversight. Reliability failures match strict products liability on all eight variables. Biological and chemical risks tie licensing with the SAFETY Act, which suggests permission before release paired with a certified liability cap for developers whose safeguards are approved.

Labour market matches displacement adjustment on all six compared variables. It is also the risk the 2021 article addressed directly, in its proposal for employer-funded retraining.

Type of Harm and Social Value 2 are the most frequent misses. Third-party wrongdoers do appear in the historical regimes, in Section 230 and the SAFETY Act. What has no precedent are the two mechanisms coded for the catastrophic risks: a harm that spreads on its own, as an engineered pathogen would, and a product that acts as the agent, as in loss of control. Both risks miss on Type of Harm against every regime in the map.

Limitations

- **Scope of the method.** The Ratio Method narrows a design choice to the precedents whose shape fits a risk, and shows which of their elements current policy lacks. It does not complete the design. Each element it suggests still needs legal and institutional analysis before it is adopted. Institutions, enforcement capacity, cost and politics all sit outside the eight variables.
- **Live policy.** Status is as of November 2026. Much of it comes from agency pages, law-firm alerts and press reports rather than statutory text. Bills and lab frameworks change often, and the verdicts should be re-checked as they do.
- **Figures.** The numbers come from different years, countries and populations. Several are not specific to AI: the FBI and ITRC counts cover all internet crime and all data breaches, and AI's share is not reported. They fix the order of magnitude, not the ratio.
- **Sources.** The Appendix lists the source for each figure. Every figure was cite-checked against its source in October 2026; nine were tightened as a result and are marked in the table (the smoker count and NPL count updated to current data; the securities-filing range widened; the TAA

start year, the sulfanilamide and thalidomide attributions, the Three Mile Island evacuation source and the 9/11 death-toll source corrected; the employment-decline figure dated). Citations to the Report give section and opening page; the eight risks are defined at §§ 2.1.1–2.3.2 (pp. 45–95).

- **Weights.** Every column counts equally. The checks drop one column at a time and re-rank under six alternative weightings (see "Weight sensitivity" above). The leader is stable where there is one and the ties are weight-dependent. Alternative classifications of the regimes have not been tested.
- **The N/A rule.** Litigation Costs are coded N/A for biological and chemical risks and for loss of control, on the ground that liability after the fact is not a meaningful remedy. That coding is not neutral. Under the matching rules a shared N/A drops the column and a one-sided N/A counts as a miss, so every ex post regime loses two columns against these two risks before any comparison is made, while licensing and displacement adjustment, the two regimes also coded N/A, lose none. The N/A coding therefore pre-commits part of the result toward ex ante licensing for exactly the two risks where licensing wins. The alternative is to code Litigation Costs for these risks on their merits (very high: causation across a spreading harm; extreme: no plaintiff may remain to sue) and compare on all eight columns. Whether licensing still leads under that coding has not been tested; the Type of Harm result, on which both risks miss against every regime, does not depend on it.
- **Average Damages basis.** Damages are per victim. For data breaches that means per notified person, which is far smaller than the cost to the breached organisation.
- **Type of Harm mapping.** Both tables need Type of Harm recast onto the six axes. Two gaps already show: lawful displacement has no reason-for-injury value, and psychological harm has no type-of-injury value.
- **Common cause.** Reliability failures are spread out but trace to one model, as DES traced to one product. This belongs in Type of Harm as a categorical axis, not in Frequency.

Appendix

▼ **Legal elements of each regime**

Regime	Who is liable	Liability standard	How victims are paid	Cap, fund insurance
Group 1. Ordinary tort.				
Abnormally dangerous activity *(Rylands, 1868)*	The person carrying on the activity.	Strict: liable even after taking all reasonable care.	Individual tort suits for damages.	None.
Strict products liability *(Greenman, 1963; §402A, 1965)*	The manufacturer and every seller in the chain.	Strict for defects; design and warning claims usually turn on risk against utility.	Individual suits, often consolidated in multidistrict litigation.	None fede states cap economic
Market-share liability *(Sindell, 1980)*	Every maker of an identical product.	When the injurer cannot be identified, each maker answers for its share of the market.	Damages divided by market share.	Each make exposure i its share.
Group 2. Aggregation of claims.				

Regime	Who is liable	Liability standard	How victims are paid	Cap, fund insurance
Fraud-on-the-market class action *(Basic, 1988)*	The issuer and officers who make a material misstatement.	Intent or recklessness; each investor's reliance is presumed.	One class action for all investors; the recovery is split pro rata.	None; the securities limits plea the measu damages.
Statutory damages/public enforcer *(FTC Act, 1914; TCPA, 1991)*	The caller or marketer.	Breach of a rule; no proof of loss is needed.	Fixed damages per violation ($500, up to $1,500 if willful, under the TCPA); FTC penalties and redress.	None; dam fixed per v
Tobacco Master Settlement *(1998)*	The participating cigarette makers.	Negotiated settlement; no fault adjudicated.	Annual payments to the states, without end, to recover public health costs (about $206 billion over the first 25 years).	Payments formula ar for sales v
CERCLA / Superfund *(1980)*	Past and present owners and operators, waste generators and transporters.	Strict, retroactive, and joint and several.	The government cleans up and sues for its costs, or orders the parties to clean up. Covers cleanup and natural-resource damage, not personal injury.	Superfunc financed i excise tax chemicals petroleum
Group 3. No-fault funds.				
Workers' compensation *(Germany 1884; US 1910s)*	The employer.	No-fault: any injury arising out of and in the course of employment.	Scheduled medical and wage benefits through an administrative claim. Workers give up the right to sue.	Employer or self-ins
Vaccine injury compensation *(1986)*	A federal trust fund pays first; makers are largely shielded from design-defect suits.	No-fault; a table of listed injuries presumes causation.	Claims heard in the Court of Federal Claims (the vaccine court).	Trust fund by a $0.75 per diseas per dose.
Displacement adjustment *(TAA, 1962; WARN, 1988)*	TAA: the federal government. WARN: the employer.	TAA: workers show that trade contributed to their job loss. WARN: no fault; a duty of notice.	Retraining, income support and job-search help; back pay where notice was missing.	Federal appropriat authority l July 2022.
Group 4. Catastrophic risk.				
Ex ante licensing *(FDA, NRC, FAA, Select Agent rules)*	The license or certificate holder.	Permission is required; the regulator sets the safety standard.	No compensation scheme of its own; tort suits continue, sometimes preempted.	None.
Price-Anderson (Nuclear Liability) *(1957)*	All public liability is channeled to the plant operator, whoever caused the accident.	For a major accident, defenses are waived: effectively strict.	Claims paid from layered insurance; above the cap, Congress decides.	Private ins ($500 mill then a poo reactor op into after a about $16 incident in
Oil spill liability *(Oil Pollution Act, 1990)*	The responsible party: the vessel owner or operator, or the facility owner.	Strict for cleanup costs and damages.	Claims go to the responsible party first, then to a federal trust fund.	Capped by or facility for gross n or breakin rules. Trus financed b barrel tax.
Space Liability Convention *(1972)*	The launching state.	Absolute for damage on Earth or to aircraft; fault-based for damage in space.	Claims between states, with a claims commission as fallback.	None in th launch lice insure to a amount, w indemnific it.

Regime	Who is liable	Liability standard	How victims are paid	Cap, fund insurance
Group 5. Shields.				
Intermediary immunity *(CDA s.230, 1996)*	The user who created the content; the platform is immune.	Immunity, with exceptions for federal criminal law, intellectual property and sex trafficking.	Only from the content's author.	Not applic
SAFETY Act *(2002)*	The seller of an approved anti-terrorism technology; claims run only against the seller, in federal court.	Designation caps liability; certification adds a presumption of immunity.	From the insurance the seller must carry; no punitive damages.	Liability ca insurance

▼ Matching rules

Rule	How it is applied
Underlying activity	Each regime and each risk is tied to the ordinary economic activity that produces the harm. Social Value 1 and 2 describe that activity, not the harm.
Frequency 1 steps	Incidents per year, relative to the exposed population. 0: none observed, or under 1 in 10 million. 1: up to 1 in 100,000. 2: up to 1 in 1,000. 3: up to 1 in 10. 4: up to 1 per person. 5: more than 1 per person.
Frequency 2 steps	People affected per incident. 0: none. 1: up to 10. 2: up to 1,000. 3: up to 100,000. 4: up to 10 million. 5: more than 10 million.
Average Damages steps	Harm per victim, relative to GDP per capita. 0: under 0.1%. 1: under 10%. 2: up to 1 times. 3: up to 10 times. 4: up to 100 times. 5: more, including death.
Other columns	Social Value 1 and both Litigation Costs columns are coded by judgment on the same six steps: near zero, low, medium, high, very high, extreme. Where no count exists, the cell says "judgment".
Match	A column matches when the risk and the regime sit on the same step or one step apart. A range such as "low to medium" counts as both steps.
Social Value 2	Coded in four categories: averse, split, accepting, favorable. Matches only on the same category.
Type of Harm	Coded on three parts: kind of injury, who or what does the harm, and onset. Matches when at least two of the three agree. Two mechanisms, spreading (a harm that propagates on its own) and a product acting on its own, appear in AI risks only; no historical regime is coded with either.
"N/A"	N/A on both sides: not compared, because a shared N/A reflects one legal fact, not independent similarity. N/A on one side only: a miss. This rule is not neutral between regimes; see "The N/A rule" under Limitations.
Ranking	Regimes are ranked by matches minus misses. Every compared column carries equal weight. That is a default, not a finding (see Open Items).
Robustness	Each result is re-run under strict matching (same step only) and with each column dropped in turn.

▼ Historical regimes: activity, frequency and damages

Regime	Underlying activity	Frequency 1: incident rate	Frequency 2: scale per incident	Average damages
Group 1. Ordinary tort.				
Abnormally dangerous activity *(Rylands, 1868)*	Hazardous land use: reservoirs, blasting, storing explosives.	Low (judgment). No national count; claims arise case by case.	Low to medium: one neighbouring mine owner in Rylands; a neighbourhood in a blast.	High (judgment): a flooded mine, a destroyed building.
Strict products liability *(Greenman, 1963; §402A, 1965)*	Mass manufacture and sale of consumer goods.	High: 20 million people injured a year in a population of about 205 million, roughly 1 in 10 (National Commission on	Low: one user per incident; the defect is shared across the product line.	Medium for the typical injury. Of the 20 million, 110,000 were permanently disabled and 30,000 killed.

Regime	Underlying activity	Frequency 1: incident rate	Frequency 2: scale per incident	Average damages
		Product Safety, 1970).		
Market-share liability *(Sindell, 1980)*	Prescription drug manufacturing: DES, sold by roughly 200 firms.	Medium: about 1 in 1,000 exposed daughters developed clear-cell cancer; 5 to 10 million people were exposed, 1938 to 1971.	Low: one patient per incident; the product is shared.	High to very high: cancer diagnosed in young adulthood.
Group 2. Aggregation of claims.				
Fraud-on-the-market class action *(Basic, 1988)*	Issuing and trading public securities.	Low: roughly 200 to 230 securities class actions are filed a year.	High to very high: thousands to millions of shareholders per misstatement.	Low: a small fraction of each investor's holding.
Statutory damages/public enforcer *(FTC Act, 1914; TCPA, 1991)*	Telemarketing and mass consumer marketing.	Extreme: 52.8 billion robocalls in the US in 2024, nearly 200 per adult (YouMail).	Low: one recipient per call.	Tiny: a nuisance call. The statute fixes $500 per violation, $1,500 if wilful.
Tobacco Master Settlement *(1998)*	Manufacture and sale of cigarettes.	High: about 480,000 US deaths a year; 28.8 million adults smoked in 2022, down from roughly 45 million in the mid-2000s, so on the order of 1 to 2 in 100 (CDC).	Low: one smoker at a time; the product is shared.	Very high to extreme: chronic disease and death. The settlement: $206 billion over 25 years to 46 states.
CERCLA / Superfund *(1980)*	Industrial production and chemical waste disposal.	Medium (judgment): about 1,340 sites on the National Priorities List.	High: a community per site; about 950 families were relocated from Love Canal.	High (judgment): homes lost, long-term health effects.
Group 3. No-fault funds.				
Workers' compensation *(Germany 1884; US 1910s)*	Industrial employment: factories, railroads, mines.	High: about 23,000 industrial deaths in 1913 among 38 million US workers (61 per 100,000); non-fatal injuries were far more common.	Low: one worker per incident.	Medium: lost wages and medical costs for the typical injury.
Vaccine injury compensation *(1986)*	Childhood vaccine manufacture and mass immunisation.	Near zero: about 1 person compensated per 1 million doses distributed (HRSA).	Low: one patient per incident.	High: serious, sometimes permanent injury.
Displacement adjustment *(TAA, 1962; WARN, 1988)*	Trade liberalisation and plant closings.	Medium: more than 5 million workers served by Trade Adjustment Assistance since 1974, on the order of 100,000 a year.	Medium to high: WARN covers layoffs of 50 or more at employers of 100 or more; large closings reach thousands.	Medium to high: lasting earnings losses.
Group 4. Catastrophic risk.				
Ex ante licensing *(FDA, NRC, FAA, Select Agent rules)*	Marketing new drugs; operating reactors; certifying aircraft and airlines; handling dangerous pathogens.	Near zero: rare events.	High to extreme: thousands of children affected by thalidomide worldwide, about 10,000 by the standard estimate; a reactor or pathogen release could reach far more. (The 1938 Act followed more than 100 deaths from Elixir Sulfanilamide.)	Extreme: death and birth defects.

Regime	Underlying activity	Frequency 1: incident rate	Frequency 2: scale per incident	Average damages
Price-Anderson (Nuclear Liability) *(1957)*	Commercial nuclear power generation.	Near zero: one major US accident (Three Mile Island, 1979).	High to very high: the 1957 federal study (WASH-740) projected up to 3,400 deaths and 43,000 injuries; about 140,000 people left the area around Three Mile Island.	Extreme as projected: deaths, and $7 billion in property damage in 1957 dollars. Actual Three Mile Island claims: about $71 million in total, no deaths.
Oil spill liability *(Oil Pollution Act, 1990)*	Transporting and drilling for oil at sea.	Near zero to low (judgment): major spills are rare. The Act followed the Exxon Valdez spill of 1989.	High to very high: more than 32,000 claimants in the Exxon Valdez punitive-damages class; Deepwater Horizon reached the coastal economies of five states.	Low to medium: 0.6% of GDP per capita when spread across the affected states (the 2021 article); far more for fishing and tourism businesses.
Space Liability Convention *(1972)*	Government and commercial space launch.	Near zero: one claim since 1972 (Cosmos 954, 1978).	None to low: no one was injured; debris fell across northern Canada.	High, borne by a state: Canada claimed C$6 million and settled for C$3 million.
Group 5. Shields.				
Intermediary immunity *(CDA s.230, 1996)*	Hosting user-generated content online.	Very high (judgment): Prodigy alone carried about 60,000 postings a day for 2 million subscribers in 1995.	Low: one person defamed or defrauded per posting.	Low to medium (judgment).
SAFETY Act *(2002)*	Selling anti-terrorism and security technology.	Near zero: one attack on the scale of 11 September 2001.	High: 2,977 killed and thousands injured.	Extreme: death.

▼ Historical regimes: social value, type of harm, litigation costs and output

Regime	Social value 1	Social value 2	Type of harm	Litigation costs 1	Litigation costs 2	Out
Group 1. Ordinary tort.						
Abnormally dangerous activity *(Rylands, 1868)*	Moderate	Split: tolerated, uncommon	Physical/property, proximate	Moderate	High: care was taken, no fault to prove	Stri on t
Strict products liability *(Greenman, 1963; §402A, 1965)*	High	Accepting of mass-produced goods	Physical, via product	High: evidence inside the factory	High: negligence unprovable	Stri on t man
Market-share liability *(Sindell, 1980)*	High: prescription drugs	Accepting: medicine is valued	Physical, onset delayed a generation	High	Very high: can't identify which maker	Liab mar
Group 2. Aggregation of claims.						
Fraud-on-the-market class action *(Basic, 1988)*	High: capital markets	Accepting: public investing is ordinary	Financial, intangible	High: claim cost exceeds individual loss	Very high: individual reliance	Pres + cl agg

Regime	Social value 1	Social value 2	Type of harm	Litigation costs 1	Litigation costs 2	Out
Statutory damages/public enforcer *(FTC Act, 1914; TCPA, 1991)*	Medium	Averse: unsolicited calls are widely resented	Financial or rights, intangible	Very high: claim cost exceeds recovery	Moderate: violation easy to show	Fixe dam age
Tobacco Master Settlement *(1998)*	Low	Averse: by 1998 public opinion had turned against smoking	Physical, prolonged	High	Very high: individual causation, assumed risk	Stat rec pub
CERCLA / Superfund *(1980)*	High: industrial production	Split: industry valued, dumping feared	Environmental, prolonged	High: decades-old records	Very high: many or defunct defendants	Retr stric + fu
Group 3. No-fault funds.						
Workers' compensation *(Germany 1884; US 1910s)*	Very high	Accepting of industrialization	Physical, workplace, immediate	High: worker vs employer	Very high: fault defenses beat most claims	No- ben emp func
Vaccine injury compensation *(1986)*	Very high	Strongly favorable	Physical, via product	High	High: medical causation	No- func shie
Displacement adjustment *(TAA, 1962; WARN, 1988)*	Very high: gains from trade	Split: trade valued, closings resented	Financial, prolonged	N/A: no claim exists	N/A: no wrongful act	Noti retr inco sup
Group 4. Catastrophic risk.						
Ex ante licensing *(FDA, NRC, FAA, Select Agent rules)*	High	Split: valued but feared	Physical, mass, spanning	N/A	N/A	Perr befo act
Price-Anderson (Nuclear Liability) *(1957)*	High	Split; the state wanted the industry	Physical, mass, spanning	Low: cause obvious	N/A: problem is solvency, not proof	Cha insu pool
Oil spill liability *(Oil Pollution Act, 1990)*	Very high: oil and gas	Split: fuel valued, spills feared	Environmental + financial, immediate	Moderate: the source of a spill is usually evident	Moderate: strict liability; the responsible party is known	Stri cap carr unc gros neg proc fina resp trus
Space Liability Convention *(1972)*	High	Favorable	Physical, cross-border	High: foreign actor	High: jurisdiction	Abs liab laun stat
Group 5. Shields.						
Intermediary immunity *(CDA s.230, 1996)*	Very high	Strongly favorable (speech)	Rights or financial, intangible, third-party agent	High: anonymous third party	High	Inte imm part
SAFETY Act *(2002)*	High: defensive technology	Favorable	Physical, third-party malice	Moderate	Moderate	Liab cap insu leve

▼ AI risks: activity, frequency and damages

Risk	Underlying activity	Frequency 1: incident rate	Frequency 2: scale per incident	Average damages
AI content crime	Generative media tools: image, voice,	Medium to high. AI-specific counts are partial: 67,000 reports of generative-AI child	Low: one victim per incident; a campaign repeats the incident.	Low to medium: the average loss per FBI complaint in 2024 was

Risk	Underlying activity	Frequency 1: incident rate	Frequency 2: scale per incident	Average damages
	video and text generation.	exploitation to NCMEC in 2024, up from 4,700 in 2023. All US internet crime: 859,532 FBI complaints in 2024; the AI share is not reported.		$19,372, about a quarter of US GDP per capita. Dignitary harm is unpriced.
Influence / manipulation	AI-generated persuasive content: advertising, marketing, political messaging.	Low to medium (judgment). The Report (§2.1.2, p. 50): documented, not yet widespread. No incident count exists.	Very high (judgment): a campaign addresses a population; reach is unmeasured.	Tiny to low per person; unmeasured.
Cyberattacks	AI-assisted software engineering and security testing.	Medium: 3,158 US data compromises in 2024 (ITRC), among several million firms. The AI share is not reported. The Report cites an AI agent finding 77% of the vulnerabilities in one competition (§2.1.3, p. 57).	Very high: 1.7 billion victim notices in 2024, about 540,000 per compromise; six breaches exceeded 100 million each.	Low to medium per notified person. Per breached organisation: $4.88 million on average (IBM, 2024).
Biological and chemical	AI-assisted biological and chemical research.	None observed.	Very high to extreme: a chemical release could reach thousands; the reference class for an engineered pathogen is COVID-19, about 7 million reported deaths (WHO).	Extreme: death.
Reliability failures	AI assistants and agents used for professional and everyday tasks.	Very high (judgment): errors are routine across about 800 million weekly users of one assistant alone (OpenAI, 2025). No incident count exists.	Low: one user per error; the cause is shared across the model.	Low to medium. Examples: a US$5,000 court sanction for fabricated citations (Mata v. Avianca, 2023); C$812 awarded against an airline for its chatbot's advice (Moffatt v. Air Canada, 2024).
Loss of control	Developing and deploying highly autonomous frontier AI systems.	None observed. This is a historical count, not a forecast.	Extreme (judgment): by definition, not contained.	Extreme: unbounded.
Labour market	Employers automating cognitive work.	Medium (judgment). The Report (§2.3.1, p. 84): no effect on overall employment so far. One study: a 13% relative decline in employment for workers aged 22 to 25 in the most AI-exposed occupations, as of July 2025 data (Brynjolfsson, Chandar & Chen, 2025); the authors' August 2026 update puts it at 16% to 19%.	Medium to high: a team or cohort per deployment.	Medium to high: lasting earnings losses.
Human autonomy	Consumer AI assistants and companion apps.	High: tens of millions of companion-app users (the Report, §2.3.2, p. 89). OpenAI estimates 0.15% of weekly users show heightened emotional attachment, about 1.2 million people at 800 million weekly users.	Low: one user per incident; the product is shared.	Low to medium; unmeasured.

▼ AI risks: social value, type of harm and litigation costs

Risk	Social value 1	Social value 2	Type of harm	Litigation costs 1	Litigation costs 2
AI content crime	High: used across media, advertising and design	Split: popular; contested over deepfakes and creators' rights	Financial + dignitary, intangible, third-party malice	High: anonymous perpetrator, claim cost exceeds loss	High: developer remote from the harm
Influence / manipulation	High	Split: persuasion is ordinary and protected; AI-made persuasion is distrusted	Rights, intangible, prolonged	Very high	Very high: causation near-unprovable
Cyberattacks	High: software underpins most industries	Accepting of automated coding and security tools	Financial, intangible, third-party malice	High: attribution	Moderate
Biological and chemical	High: drug discovery and biomedical research	Favorable: medical research is strongly valued	Biological + physical harm; spreading; onset uncertain	N/A ex post	N/A ex post
Reliability failures	Very high	Accepting: tolerant of errors so far	Financial, via product, immediate	Moderate: failure visible	High: fault is inside the model
Loss of control	High	Split: wanted for productivity, feared for autonomy	Physical + financial harm; the product acts on its own; onset uncertain	N/A ex post	N/A ex post
Labour market	Very high: productivity gains	Split: gains valued, job loss feared	Financial, prolonged	N/A: no claim exists	N/A: no wrongful act
Human autonomy	Moderate	Split	Psychological, prolonged	High	Very high: causation and consent

▼ Sources for the figures cited

Figure	Source	Status
20 million injured, 110,000 disabled, 30,000 killed a year	National Commission on Product Safety, Final Report (1970)	Checked, Sept 2026
859,532 complaints; $16.6 billion; $19,372 average loss	FBI Internet Crime Complaint Center, 2024 Annual Report	Checked, Sept 2026
4,700 (2023) and 67,000 (2024) generative-AI reports	National Center for Missing & Exploited Children, CyberTipline data	Checked, Sept 2026
3,158 compromises; 1.7 billion victim notices	Identity Theft Resource Center, 2024 Annual Data Breach Report (as updated)	Checked, Sept 2026
52.8 billion robocalls; nearly 200 per adult	YouMail Robocall Index, 2024	Checked, Sept 2026
77% of vulnerabilities; tens of millions of companion users; no effect on overall employment; manipulation documented, not widespread	The Report, executive summary (p. 11) and §§ 2.1.2 (p. 50), 2.1.3 (p. 57), 2.3.1 (p. 84), 2.3.2 (p. 89)	Checked, Sept 2026; section pinpoints added Oct 2026
Tobacco: about $0.85 to 1 trillion a year worldwide	MarketLine, Tobacco & Tobacco Products Global Industry Guide (2024: $844 billion); Statista (2024: $965 billion)	Checked, Sept 2026
Automobiles: about $2 to 2.5 trillion a year in new car sales worldwide	MarketLine, New Cars Global Industry Guide (2024: $2.44 trillion); Statista (2024: $1.98 trillion)	Checked, Sept 2026
Vaccines: about $50 billion a year worldwide, excluding COVID-19	Industry market estimates for 2024; WHO Global Vaccine Market Report for market structure	Checked, Sept 2026
Capital markets: about $30 trillion raised a year worldwide;	SIFMA, Capital Markets Fact Book 2026 (2025 data)	Checked, Sept 2026

Figure	Source	Status
$157.8 trillion equity market capitalization		
$1.3 trillion of US economic activity from oil and gas (2015); Deepwater Horizon ratios	PwC for the American Petroleum Institute (2017) and the Sample Data Set, both as cited in Margolin & Frazier (2021)	From the article
More than 32,000 Exxon Valdez claimants (the punitive-damages class)	Exxon Shipping Co. v. Baker, 554 U.S. 471, 479 & n.6 (2008)	Checked, Oct 2026
23,000 industrial deaths among 38 million workers (1913)	CDC, "Improvements in Workplace Safety," 48 MMWR 461 (June 11, 1999), citing Bureau of Labor Statistics	Checked, Oct 2026
480,000 deaths a year; 28.8 million adult smokers (2022); about 45 million in the mid-2000s	CDC: 2014 Surgeon General's Report (deaths); "Cigarette Smoking in the United States," 2022 data (smokers)	Checked, Oct 2026 (smoker count updated)
$206 billion over 25 years; 46 states	Master Settlement Agreement (1998); GAO, Tobacco Settlement, GAO-01-851 (2001)	Checked, Oct 2026
5 to 10 million exposed; about 1 in 1,000; roughly 200 firms	NCI, DES Exposure and Cancer fact sheet; Sindell v. Abbott Laboratories, 26 Cal. 3d 588, 602 (1980)	Checked, Oct 2026
Roughly 200 to 230 securities class actions a year (215 in 2023; 225 in 2024)	Cornerstone Research & Stanford Securities Class Action Clearinghouse, Securities Class Action Filings: 2024 Year in Review	Checked, Oct 2026 (range widened)
About 1,340 National Priorities List sites (1,343 final, March 2026); about 950 Love Canal families	EPA, Current NPL Updates; EPA Region 2 on Love Canal	Checked, Oct 2026 (NPL count updated)
About 1 compensated per 1 million doses	HRSA, National Vaccine Injury Compensation Program Data & Statistics (Oct. 2026)	Checked, Oct 2026
More than 5 million workers since 1974; WARN thresholds	Department of Labor, TAA program inventory; 29 U.S.C. § 2101(a)(1) (coverage), § 2102(a) (60 days' notice)	Checked, Oct 2026 (year and pinpoint corrected)
$500 per violation; up to $1,500 at the court's discretion for wilful violations	47 U.S.C. § 227(b)(3)(B)–(C)	Checked, Oct 2026
More than 100 deaths, 107 by the standard count (Elixir Sulfanilamide); thousands of children, about 10,000 by the standard estimate (thalidomide)	FDA history ("more than 100"; "thousands"); Wax, Annals of Internal Medicine (1995) for 107; the 10,000 figure is from secondary literature, not FDA	Checked, Oct 2026 (attribution corrected)
3,400 deaths, 43,000 injuries, $7 billion (projected); $71 million and about 140,000 to 144,000 people (Three Mile Island)	AEC, WASH-740 (1957); NRC Backgrounder, Nuclear Insurance and Disaster Relief ($71 million); Kemeny Commission and Dickinson College TMI archive (evacuation)	Checked, Oct 2026 (evacuation source corrected)
C$6.04 million claimed, C$3 million paid	Canada, Statement of Claim (Jan. 23, 1979) ¶¶ 8, 24; Canada–USSR Protocol (Apr. 2, 1981), art. I	Checked, Oct 2026
60,000 postings a day; at least 2 million subscribers	Stratton Oakmont, Inc. v. Prodigy Services Co., 1995 WL 323710, at *1, *3 (N.Y. Sup. Ct. 1995)	Checked, Oct 2026
2,977 killed	National September 11 Memorial & Museum / NYC Office of Chief Medical Examiner. The 9/11 Commission Report gives component figures only (more than 2,600 at the World Trade Center, 125 at the Pentagon, 256 on the planes)	Checked, Oct 2026 (source corrected)
About 7 million reported COVID-19 deaths	WHO COVID-19 Dashboard (cumulative reported deaths just over 7 million)	Checked, Oct 2026
$4.88 million average breach cost (global average)	IBM & Ponemon Institute, Cost of a Data Breach Report 2024	Checked, Oct 2026
US$5,000 sanction; C$812.02 award	Mata v. Avianca, Inc., 678 F. Supp. 3d 443 (S.D.N.Y. 2023); Moffatt v. Air Canada, 2024 BCCRT 149	Checked, Oct 2026
13% relative employment decline, ages 22 to 25 (July 2025 data)	Brynjolfsson, Chandar & Chen, "Canaries in the Coal Mine?" (Aug. 2025); the Aug. 2026 update reports 16% to 19%	Checked, Oct 2026 (dated)

Figure	Source	Status
0.15% of weekly users; about 800 million weekly users	OpenAI, "Strengthening ChatGPT's responses in sensitive conversations" (Oct. 27, 2025) for 0.15%; OpenAI DevDay keynote (Oct. 6, 2025) for 800 million	Checked, Oct 2026

▼ Sources for the live-policy test

Measure	Source
TAKE IT DOWN Act	www.ftc.gov
NO FAKES Act	www.dailyjournal.com
EU AI Act Article 55 (systemic-risk duties)	ai-act-service-desk.ec.europa.eu
EU AI Act: GPAI and systemic-risk obligations	digital-strategy.ec.europa.eu
EU AI Act: first enforcement steps	www.matheson.com
EU Digital Omnibus on AI	cdp.cooley.com
EU AI Act Art. 5 (manipulation)	fpf.org
EU marking and labelling of AI content	www.jonesday.com
EU Product Liability Directive	cms.law
EU AI Liability Directive withdrawal	eapil.org
EU Cyber Resilience Act reporting	www.jonesday.com
SEC cyber incident disclosure	www.clearygottlieb.com
CIRCIA final rule	www.insideprivacy.com
OpenAI Preparedness Framework (v2)	cdn.openai.com
OpenAI critical cyber capability	openai.com
Google DeepMind Frontier Safety Framework	deepmind.google
Anthropic Responsible Scaling Policy	www.anthropic.com
Anthropic RSP v3 analysis (GovAI)	governance.ai
Anthropic heightened protections, May 2025	www.nbcdfw.com
OpenAI trusted access for life sciences	openai.com
California SB 53	natlawreview.com
New York RAISE Act	www.wiley.law
California SB 813	digitalpolicyalert.org
AI Risk Evaluation Act (S.2938)	www.govinfo.gov
Anthropic CEO testing proposal, June 2026	decrypt.co
AI liability insurance in the US	www.insurancejournal.com
Garcia v. Character Technologies	www.transparencycoalition.ai
AI products-liability cases	ailawsuittracker.com
AI LEAD Act (S.2937)	www.govinfo.gov
RISE Act (S.2081)	www.lummis.senate.gov
New York WARN AI disclosure	natlawreview.com
AI-Related Job Impacts Clarity Act (S.3108)	policyrisk.com
Trade Adjustment Assistance termination	www.dol.gov
California SB 243	natlawreview.com
California SB 1119	www.hunton.com
GUARD Act	www.globalpolicywatch.com
Florida v. OpenAI	fortune.com
FTC study of companion chatbots	www.mlex.com

Citation

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@online{margolin2026precedents,
  author = {Harrison C. Margolin},
  title  = {Precedents: Matching Frontier AI Risks to Liability Regimes},
  year   = {2026},
  note   = {Independent report; figures cite-checked October 2026}
}
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Footnotes

1. Harrison C. Margolin & Grant H. Frazier, *The Ratio Method: Addressing Complex Tort Liability in the Fourth Industrial Revolution*, 52 St. Mary's L.J. 679 (2021).

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