A Guide to the EU Clinical Trial Regulation (CTR) & CTIS

By Adrien Laurent, CEO at IntuitionLabs • 11/18/2025 • 40 min read





Executive Summary

The EU Clinical Trial Regulation (CTR, Regulation 536/2014) represents a landmark reform of the European clinical trials framework. It repeals the old Clinical Trials Directive (2001/20/EC) and introduces a comprehensive, centralized regulatory regime for human interventional studies. Enacted in June 2014 but only applying from 31 January 2022 (after the launch of the new EU Clinical Trials Information System (CTIS)), the CTR creates a single EU portal and database for trial submissions and information. The new system harmonizes rules across all Member States, enabling sponsors to submit one multi-country application via CTIS and obtain a coordinated single decision, rather than navigating up to 27 separate national procedures (health.ec.europa.eu) (www.ema.europa.eu). The CTR also tightens timelines for authorizations, strengthens subject protections, and vastly expands public transparency: most trial data in the CTIS is publicly searchable unless specific confidentiality grounds apply (health.ec.europa.eu) (www.ema.europa.eu).

The transition to the CTR and CTIS has had profound effects on sponsors, regulators, and patients. From January 2023 all new trial applications must use CTIS, and by January 2025 all ongoing trials under the old Directive must migrate into CTIS. The European Medicines Agency (EMA), national regulators, and the European Commission have invested heavily in training, guidance and outreach (the *Accelerating Clinical Trials* (ACT EU) initiative) to facilitate this change. Early indicators are mixed: the CTR has indeed simplified multi-country trials and improved transparency (over 8,600 trials are now publicly accessible in CTIS) (www.ema.europa.eu) (www.ema.europa.eu), but sponsors report "heartburn" from steeper timelines, more complex document requirements, and new technical challenges ([1] www.clinicaltrialsarena.com) ([2] trialsjournal.biomedcentral.com). On balance, most stakeholders agree that the CTR provides a clearer, more unified framework, but stress the need for ongoing system improvements, more training, and pragmatic flexibility to avoid unintended obstacles.

This report provides an in-depth analysis of the CTR and CTIS: its historical background and rationale, detailed features and processes, implementation timeline, data on uptake and performance, stakeholder experiences (with case studies), remaining challenges, and future directions. Key findings include the CTR's success in harmonizing procedures and enhancing transparency (health.ec.europa.eu) (www.ema.europa.eu); a sharp increase in multi-country trial efficiency; the central role of the EMA-maintained CTIS portal and public trial database; revisions to transparency rules (eliminating the old 7-year deferral) to make more data immediately available (www.ema.europa.eu) (www.ema.europa.eu); and ongoing efforts under the ACT EU initiative to refine processes (training, guidance, "trial map" tools, ICH GCP modernization, etc.) (accelerating-clinical-trials.europa.eu) (accelerating-clinical-trials.europa.eu). Both national and EU regulators aim eventually to fulfill ambitious targets—such as adding 500 new multinational trials and having two-thirds of trials begun recruiting within 200 days of application (www.ema.europa.eu)—by further streamlining and digitalizing clinical research.

Key Data: For context, the EMA reports that by mid-2024 CTIS had over 8,600 trials with authorisation decisions publicly available (www.ema.europa.eu). In the one-year voluntary transition (Jan 2022–Jan 2023), 80% of sponsors still filed via the old Directive system (^[3] www.contractpharma.com). Over 60% of active trials that needed migration were eventually submitted for transition in the second half of 2024 (after EMA eased guidance and deferral rules) (^[4] www.contractpharma.com). The CTCG noted that on average 50–60% of trials used to start within 200 days (0.5 year) under the Directive, and ACT EU now targets raising this to 66% for future trials (www.ema.europa.eu). These numbers underscore the scale of change and remaining room for improvement under the CTR.

This report synthesizes all these developments with extensive references. It covers the CTR's legislative evolution, core requirements (single submission, mutual recognition, safety reporting, protection of subjects, transparency), the design and operation of CTIS, statistical evidence of implementation, stakeholder surveys and case analyses (including three multi-country infection "SolidAct" trials ([2] trials journal.biomedcentral.com)), and forward-looking initiatives. All statements are grounded in authoritative sources, including EU legislation,

EMA/Commission reports and publications, and peer-reviewed and industry analyses (health.ec.europa.eu) (www.ema.europa.eu) ([2] trialsjournal.biomedcentral.com) ([3] www.contractpharma.com).

Introduction and Background

Clinical trials are fundamental to evaluating new medicines. In the EU, clinical research has historically been regulated by national laws based on the 2001 Clinical Trials Directive (CTD) (2001/20/EC). While the CTD aimed to harmonize procedures across Member States, in practice it left many national differences (e.g. in documents, timelines, ethics review) ([5] www.celegence.com) 19⁺. Indeed, soon after 2004 the European Commission launched a review and found that the directive had only "partly achieved" a coordinated approach ([5] www.celegence.com). Companies and researchers conducting trials in multiple countries faced onerous paperwork and administrative duplication, leading to delays and even a decline in EU-based studies. By the mid-2010s, stakeholders widely recognized that a new regulatory framework was needed to revitalize the EU clinical research environment.

Against that backdrop, Regulation (EU) No. 536/2014 – the **EU Clinical Trials Regulation (CTR)** – was adopted in 2014. Unlike a directive, a regulation has direct effect in all Member States without transposition into national law, giving truly uniform rules. Crucially, Article 81 of the CTR required development of a centralized *EU Portal and Database* to be managed by EMA and the Member States; this would serve as the single entry point for trial applications and house trial information. Hence the law could only take effect once a fully functional system (CTIS) was ready.

Inside industry, observers hoped the CTR would make Europe a more attractive destination for trials. A 2020 Commission impact assessment stressed that "conducting clinical trials in the EU/EEA" was expected to become "easier" under the CTR with its single application procedure, and that the reform should "increase the number of studies conducted within the EU" (health.ec.europa.eu). The key objectives were to simplify submissions, unify assessments, strengthen subject protections (e.g. uniform informed consent rules, insurance requirements), and expand transparency of results and protocols.

The last of these—transparency—was in part a reaction to criticism that much trial data was hidden or delayed under the CTD regime, sometimes leading to publication bias. The CTR set out a public-access database requirement to make trial information (protocols, results, etc.) available to health professionals, patients and the public, unless legitimately confidential (health.ec.europa.eu) (www.ema.europa.eu).

Despite adoption in 2014, the CTR could not enter into application until its required IT infrastructure was ready. After several delays, the EMA's project team declared CTIS "fully functional" by April 2021. On 31 July 2021, the European Commission announced that the CTR would apply from 31 January 2022 (health.ec.europa.eu). Thus, on that date CTIS launched and the CTR formally repealed the Directive. A three-year transition period was then instituted: from Jan 2022 to Jan 2023 sponsors *could* choose to use either the old or new system, and from Jan 2023 to Jan 2025 all new applications must use the CTR (and the old Directive could only govern legacy trials). By 30 January 2025, all ongoing trials initiated under the Directive were required to migrate into CTIS, or else their authorisation would lapse ([6] www.celegence.com) (www.ema.europa.eu).

In sum, the CTR/CTIS framework is now the law of the land for new clinical trials in the EU/EEA. It replaces dozens of divergent national procedures with a unified, well-defined process using a common digital platform. This change affects sponsors (both commercial and academic), national regulators, ethics committees, investigators, and patients. Its scale and ambition rank it among the most significant regulatory overhauls in EU pharmaceutical law. The sections below analyze the regulation's provisions, implementation details, practical outcomes, and future developments in exhaustive detail.



The EU Clinical Trial Regulation (CTR): Key Provisions

The Clinical Trial Regulation (EU) No. 536/2014 establishes a comprehensive EU-wide system for authorising and supervising clinical trials on medicinal products. Because it is an EU Regulation, its provisions apply uniformly without variation among Member States. Key innovations include:

- Single Submission and Assessment: Under the Directive, sponsors had to make separate applications to each national authority or ethics committee. CTR replaces this with a single submission to CTIS, which routes information to all concerned Member States at once. Member States then coordinate their review of the dossier. Typically, one country is appointed rapporteur (lead assessor) and others co-rapporteurs, producing a single Assessment Report for all. Ultimately, all chosen Member States give a harmonised Decision on approval, rather than potentially conflicting national decisions (health.ec.europa.eu) (www.ema.europa.eu). Whichever country is leading coordinates queries and remedies. This streamlines what was previously dozens of overlapping procedures into one coordinated process.
- Defined Timelines: The CTR imposes strict time frames. For a standard trial (non-low-intervention), Member States have 45 days (42 review + 3 clock-stop for sponsor answers) to give an initial decision, plus an extra 12 days to finalise the written decision with or without conditions. Combined, evaluation phases are intended to take no more than 60 days after dossier completenesses (health.ec.europa.eu). In practice, multi-country trials now commonly see decisions in 60–90 days, compared to much longer under the old system. The Commission explicitly aimed for faster starts to trials (the ACT EU initiative later set targets like 66% of trials beginning patient recruitment within 200 days of submission, up from ~50% (www.ema.europa.eu)).
- Risk-based Categorization Low-Intervention Trials: The CTR introduces the concept of "low-intervention clinical trials," broadly those involving authorized products used in accordance with their marketing authorisation or supported by published data. Such trials are subject to lighter requirements (e.g. reduced insurance rules, simplified labelling). This encourages low-risk pragmatic or comparative trials. Under the Directive this category didn't formally exist.
- Sponsor Responsibilities: The CTR clarifies sponsor and investigator duties. All sponsors (commercial or academic) dealing with EU trials must be established in the EU/EEA. The Regulation also allows for co-sponsorship arrangements.
 Common EU rules govern Good Manufacturing Practice, pharmacovigilance (safety reporting), and liability (insurance), aiming to harmonize standards. For example, sponsors must report serious adverse events in defined timelines, and they must have appropriate insurance as per Articles 74-80. These were previously variously defined in national laws.
- Informed Consent and Subject Protection: The CTR standardises informed consent requirements (Article 29) and has
 strict provisions for vulnerable subjects. For instance, trials in incapacitated subjects or minors must meet an
 "unsatisfactory therapeutic alternatives" test and obtain assent as well as consent. Once consent is obtained, it must be
 documented on the harmonised Consent Form template. These rules aim to protect participants in all EU trials equally.
- Transparency and Data Publication: Articles 80–81 of the CTR require that most data and documents in the CTIS be made
 publicly available, in the CTIS public portal, unless specific exemptions apply (www.ema.europa.eu). Typical exemptions
 cover personal patient data, trade secrets (commercially confidential information), confidential communications between
 regulators, etc. Public information includes trial protocol summaries, recruitment status, ethical opinions, and results. The
 Regulation originally allowed sponsors to request limited deferrals (postponements) for publishing certain data (to protect
 confidentiality), but EC and EMA have since significantly curtailed those deferrals (see Section on Transparency below).
- Transitional Provisions: Article 98 has detailed rules on how to transition existing trials: those ongoing or approved under
 the Directive might continue until their planned end, but if extending beyond 30 Jan 2025 they must re-submit under CTR
 via CTIS. A new dedicated submission type exists for "transition applications" of legacy trials. Non-compliance after 31 Jan
 2025 means trials lose their authorisation.

These features are a major departure from the Directive era. The CTR was carefully designed to remove duplicated effort and contradictions between Member States, to apply consistent high standards of safety and ethics, and to leverage a unified IT platform. For example, the EU Commission notes that the CTR "repeals the Directive... [and] introduces an authorisation procedure based on a single submission via a single EU portal, an assessment procedure leading to a single decision" (health.ec.europa.eu). Similarly, EMA emphasizes that CTIS

(the portal) is the "backbone of the new regime" and that it enables sponsors to apply for multi-country trials through "a single online application" (www.ema.europa.eu).

In practice, sponsors now prepare a comprehensive dossier in CTIS divided usually into Part I (general trial information, protocol) and Part II (country-specific documents: e.g. local consent forms, insurance, investigator details). Once paid the EU fee and formally submitted, CTIS routes it; assessment proceeds concurrently in all Member States. The sponsor may interact with regulators via a secure CTIS workspace, addressing any *Request for Information (RFI)* queries. At decision, all designated countries' ethics and NCA decisions are consolidated into one authorisation letter per Member State. (For details of CTIS workflows, see following sections.)

The CTR also aligns the EU with global developments. It explicitly encourages risk-based, decentralized trial methods, electronic informed consent, and use of big data. It (and especially the ACT EU program) plan to harmonize with forthcoming ICH GCP E6(R3) guidelines, which will further modernize trial practice (accelerating-clinical-trials.europa.eu). Thus, the CTR is not static law but feeds into a dynamic modernization of Europe's clinical trial ecosystem.

Implementation Timeline and Transition

The path to full CTR implementation spanned over a decade. Below are key milestones:

Date	Event		
16 June 2014	CTR (Reg 536/2014) enters into force (after Council, Parliament adoption).		
31 Jan 2022	CTR becomes applicable. EU Portal/Database (CTIS) goes live; CTR repeals Directive. Initiated 1-year optional phase (Phase I: CTR live, but sponsors may still use CTD). (health.ec.europa.eu) (www.ema.europa.eu)		
31 Jan 2023	CTIS mandatory for all new trials. End of optional Phase I. New Phase II: all initial trials must be submitted under CTR via CTIS. Directive cannot be used for new trials. (health.ec.europa.eu) (www.ema.europa.eu)		
18 Jun 2024	Revised CTIS transparency rules come into effect (new public portal version) – essentially <i>no more deferrals</i> . More trial data/documents made immediately public (www.ema.europa.eu) (accelerating-clinical-trials.europa.eu).		
30 Jan 2025	End of transition period (Phase II). All ongoing CTD trials must have transitioned to CTR via CTIS. Unanswered transition applications by this date incur serious consequences ([6] www.celegence.com) (www.ema.europa.eu).		
Mar 2025	Launch of CTIS Trial Map (public tool for patients/doctors to find trials by condition/location) (www.ema.europa.eu) (accelerating-clinical-trials.europa.eu). CTIS designated WHO Primary Registry (global registry status) (www.ema.europa.eu).		
Ongoing (Post-2025)	ACT EU initiatives continue: targets for trial performance (e.g. +500 multinational trials over 5 years, 66% on-time recruitment) (www.ema.europa.eu); continued system improvements and training.		

Table 1: Key milestones in the CTR/CTIS implementation. The CTR entered into application only when EMA confirmed CTIS readiness in 2021 (health.ec.europa.eu). A transitional period (Jan 2022—Jan 2025) eased the shift: sponsors had up to early 2023 to switch to CTIS, and until Jan 2025 to migrate old trials.

During the initial optional year (Phase I: Feb 2022–Jan 2023), sponsors overwhelmingly preferred the familiar Directive procedures: "80% of trials" filed in that period were uploaded to the old EudraCT system ([3] www.contractpharma.com). The EMA later confirmed this sharp initial reliance on CTD processes reflected conservative sponsor behavior. From 1 Feb 2023 onward, CTIS became the **sole entry point**. According to EMA/ACT EU reports, thousands of applications have since flowed through CTIS.

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A wave of operational changes accompanied these dates. EMA and Member States published extensive guidance on the new system, held training webinars and "walk-in clinics," and updated their legislation and fee schedules for CTR compliance. Notable examples: updated Q&As, the CTIS **Sponsor Handbook**, and specific guidelines on protecting personal and confidential data in CTIS (accelerating-clinical-trials.europa.eu). In mid-2023, to encourage completion of the transition roadmap, regulators clarified certain points (e.g. allowing reuse of documents from CTD dossiers and defining which trial sites count as "active") ([7] www.contractpharma.com). These interventions proved effective: a ContractPharma analysis notes that by late 2024, 62% of active-trial transition applications were filed between June and October 2024 (shortly after the June 2024 transparency revision and with the Jan 2025 deadline looming) ([4] www.contractpharma.com).

From an IT perspective, the launch and maturation of CTIS has been iterative. At its inception, CTIS had some bugs and missing features, but developers have since released multiple updates. For example, on 20 September 2024 the CTIS public portal introduced advanced search, multilingual result lists, and easier access to trial documents (accelerating-clinical-trials.europa.eu). EMA's 2024 Annual Report notes a "new version of CTIS was launched" in June 2024, reflecting improved transparency functionality (www.ema.europa.eu). In early 2025, the "Trial Map" module went live, integrating with CTIS to empower patients to locate trials by disease and geography (www.ema.europa.eu) (accelerating-clinical-trials.europa.eu). These ongoing refinements underscore that CTIS is a living system under active development.

In summary, the rollout of the CTR and CTIS followed a carefully planned schedule enforced by binding dates. The table above and timeline narrative capture the major regulatory triggers and milestones. Amid this process, the regulators have collected and published extensive statistics on CTR implementation (via ACT EU progress reports and surveys), which will be examined in later sections. Overall, by November 2025 the CTR regime is fully in force, with the EU portal and database central to all clinical trial submissions and oversight (health.ec.europa.eu) (www.ema.europa.eu).

The Clinical Trials Information System (CTIS)

CTIS is the web-based platform mandated by the CTR to support all aspects of trial applications and information. It consists of:

- A **secured sponsor workspace**, where applicants (sponsors or representatives) log in to prepare and submit applications, manage trials, communicate with regulators, and upload documents.
- A secured regulator workspace, used by national competent authorities and ethics committees in their review processes.
- A **public portal and query interface**, available to anyone online, which displays non-confidential trial information and allows searching the EU database.

CTIS, managed by the EMA (in collaboration with Member States and the Commission), is fundamentally the engine of EU trial regulation. Its centerpiece function is the *submission* of an initial Clinical Trial Application (CTA) for one or more countries simultaneously. Within CTIS, a sponsor creates a new application dossier, indicates which Member States are involved, and submits the Part I (core clinical info) and Part II (country-specific info) documents. The system then sends an automated notification to each Member State's regulators. Each Member State assesses Part I centrally (via the coordinated procedure) and Part II locally, and all communications (Requests for Information, responses, final decisions) are tracked within CTISライブ. When authorised, the system issues each country's decision letter and lists the "sites" (study centers) in CTIS.

Importantly, because CTIS is the single-entry point, sponsors need only submit *once* even for a trial spanning many countries. The application is still assessable by up to 30 EEA countries; as EMA notes, sponsors can apply "in up to 30 EEA countries via a single online application" (www.ema.europa.eu). This is a vast improvement over

the pre-CTR situation, where a 15-country study might require 15 different submissions. CTIS also streamlines modifications: any amendment to a trial protocol (e.g. adding a site, changing an arm) is done via CTIS, which again notifies all concerned nations.

On the public side, CTIS offers transparency. The public database (the successor to the old EU Clinical Trials Register) now carries information on all past and present EU trials (except entirely phase 1 first in human trials, which remain confidential to protect trade secrets). The rules require that most submitted documents become public: e.g. the protocol, summaries, results summaries, annual safety reports, etc. (www.ema.europa.eu). The public query portal allows searches by trial title, condition, sponsor, country, EudraCT number, etc. In 2025 new features have greatly improved usability: for example, search results are now available in all EU languages, and trial pages include expanded summaries, contact points at study sites, and a trial map showing locations (accelerating-clinical-trials.europa.eu) (www.ema.europa.eu). Users can even download full trial dossiers or subscribe to RSS feeds of results (accelerating-clinical-trials.europa.eu). In March 2025, EMA launched the CTIS Trial Map (via ACT EU) that graphically shows trials on a map by geography and indication, further aiding patient participation (www.ema.europa.eu) (accelerating-clinical-trials.europa.eu).

Internally, CTIS enforces timelines and communication flows. For example, once Day 0 for an application passes, the system automatedly notifies regulators of deadlines. Sponsors receive RFIs and can submit responses through secure messaging in CTIS. There are also audit trails and logos to confirm authorities. CTIS automatically generates the part of the Clinical Trial Registry Number and other technical registration data. For trials involving investigational products, CTIS also tracks related manufacturing and lab reporting obligations.

CTIS's development was a multi-year project. After initial issues, the system has worked smoothly by late 2024. EMA maintains a detailed CTIS handbook and FAQs for users (accelerating-clinical-trials.europa.eu). The EMA hosts frequent outreach events (e.g. "Walk-in clinics," user training) to address questions about using CTIS (accelerating-clinical-trials.europa.eu). The uptick in sponsor confidence is evident: by mid-2024, a large backlog of previously halted transition applications was cleared, and new trial applications via CTIS have steadily grown. According to ACT EU data, even non-commercial sponsors (academic, consortiums) report increasing proficiency with CTIS, helped by coordinated workshops and updated guidance (acceleratingclinical-trials.europa.eu) ([8] www.contractpharma.com).

CTIS and Multi-National Trials: The new system especially benefits multi-center studies. A case in point is the experience of three large academic outbreaks-related trials (EU-SolidAct platform studies). These were among the first to submit under both the old Voluntary Harmonisation Procedure (VHP) and new CTIS ([9] trialsjournal.biomedcentral.com). Under the Directive/VHP, one such trial (Bari-SolidAct) took a median 158 days from initial submission to national approvals in 14 countries ([10] trialsjournal.biomedcentral.com). Under CTR/CTIS, follow-up trials in the same program (AXL-SolidAct, MOSAIC) obtained multi-country authorisations in about 60-80 days (Table 2 in [59]). This suggests CTIS has delivered faster regulatory coordination.

Nevertheless, the actual CTIS platform has posed some technical hurdles. Researchers reported instances of system bugs, confusing interface elements, or slow document upload in early 2022-23. With each software update, many issues have been resolved, and EMA now offers specific workarounds and helpdesk support. For instance, as of late 2024, users could download entire trial document packages effortlessly (acceleratingclinical-trials.europa.eu) - a feature not originally available. Overall, user sentiment is progressively more positive: as one industry commentator noted, "EMA's efforts to simplify the process ... has helped sponsors familiarize with the CTR" ([8] www.contractpharma.com). The fact that CTIS was designated as a WHO Primary Registry in 2025 also signals reliability: it now meets WHO/ICMJE standards for trial registries (www.ema.europa.eu).

Data Publication and Transparency

One pillar of the CTR is transparency. Articles 80–81 mandate that *all* information in CTIS be public *unless* a justified confidentiality ground is invoked. In practice, this means the following are *normally published* in the public portal:

- Trial identification and administrative data (title, sponsor, countries, etc.)
- The trial protocol and protocol amendments (redacted for confidential sections)
- A lay and professional summary of the protocol/objectives
- Status of trial (recruiting, completed, etc.) and patient enrollment numbers
- Ethical opinions by Member States (with justifications)
- Safety reports and annual reports (after trial completion)
- Final report and results summaries.

Certain categories can be withheld or redacted: notably, personally identifiable information (patient data) is never public; commercially confidential information (CCI) such as manufacturing processes or strategic plans can be protected, especially if a sponsor has a legitimate business reason (but within limits); communications between Member States during assessment are confidential; and data needed for supervision by NCAs (like inspection reports) remain confidential (www.ema.europa.eu).

Initially, the CTR allowed sponsors to **defer** publication of some parts of data for up to 7 years post-trial, especially in Phase 1 or commercially sensitive details. However, in practice this deferral mechanism was widely seen as undermining transparency. As a result, in June 2024 EMA issued *revised transparency rules*: new CTIS version 2.0 effectively eliminated the routine deferral option. Under the new regime, obtained retroactively to cover all trials, most core documents are to be published either immediately upon trial start/completion or within a short timeframe (www.ema.europa.eu). Specifically, EMA reported that **8,600+ clinical trials** with authorisation decisions were made publicly accessible under the revised rules since Feb 2022** (www.ema.europa.eu). This is a dramatic expansion of accessible data. Notably, documents that formerly could be hidden (e.g. full protocols) are now largely published in redacted form; only truly sensitive data (like market-authorization-in-progress status) remain exempted as CCI (www.ema.europa.eu).

The impact is significant. Healthcare professionals, methodologists and patient groups can now inspect trial designs and outcomes for most EU trials. For example, patient advocacy groups applaud that CTIS provides lay summaries in national languages. The new trial map allows patients to find real-time opportunities to join studies (accelerating-clinical-trials.europa.eu). In [Table of differences], we contrast the openness before and after CTR: the previous EU Register had only limited fields (with results often missing), whereas CTIS under CTR offers a rich public dossier. The WHO registry designation also means CTIS feeds into the global ICTRP database, ensuring publications in journals like *NEJM* or *Lancet* (per ICMJE rules) can cite entries in CTIS.

However, sponsors have voiced concerns. Industry representatives felt the initial CTR transparency rules were overly strict, fearing loss of competitive advantage if sensitive data (like unlicensed product details) became public too soon ([1]] www.clinicaltrialsarena.com) ([7]] www.contractpharma.com). EMA's re-writing of the rules in mid-2024 was partly a response to such feedback: under the new rules, some documents can be entirely omitted from CTIS publication if justified (e.g. detailed competitor-sensitive appendices). These measures aim to strike a balance: protect genuine trade secrets while maximizing useful information. In practice, after June 2024 sponsors had less incentive to stretch out transitions: as ContractPharma notes, "[t]he revised rules removed many documents from publication entirely," which in turn spurred sponsors to transition trials before the deadline without fear of premature disclosure ([11]] www.contractpharma.com).

In summary, the CTR-era CTIS dramatically improves trial transparency. Virtually every trial in the EU/EEA is now registered in a public repository that would never have existed a decade ago. The data, which is updated in real time (e.g. amendments posted within days), allows stakeholders to monitor trial conduct and results at an unprecedented level. But this openness comes with responsibilities: investigators must prepare lay summaries

for eventual publication, and sponsors must consider redaction from the start. The net result is that EU trial information visibility now rivals (and arguably exceeds) that of other major regions, aligning Europe with 21st-century standards of research openness.

Implementation Progress: Data and Metrics

The Accelerating Clinical Trials (ACT-EU) initiative (a joint effort of EC, EMA, HMA, etc.) has been systematically tracking CTR implementation. ACT-EU publishes periodic **progress reports** drawing on CTIS data, offering metrics on trial applications and authorizations. Key indicators include:

- Number of applications submitted (initial CTAs, modifications, renewals).
- Number of trials authorised (approved) versus refused or withdrawn.
- Sponsor origin (commercial vs non-commercial).
- Scope (national vs multi-country; trial phase; therapeutic area).

These reports, based on CTIS analytics, reveal early trends. For example, EMA reported that in 2022 (first year of CTR) well over 1,000 initial CTAs were submitted via CTIS. The majority of those were multinational (applying to 2 or more countries). Commercial sponsors have formed the bulk (~80%) of applications, reflecting industry investment; the remaining ~20% were academic or investigator-initiated trials (www.ema.europa.eu). Over time, the number of applications continued to rise as CTR mandated use. In 2023, as CTIS usage became mandatory, the pace of new CTAs accelerated. Unfortunately, EMA does not publicly release precise counts for 2024 in their annual reports (those focus on drug approvals), but ACT-EU bulletins indicate thousands of new CTAs annually under CTR.

One marked effect is in **multinational trial capacity**. Prior to CTR, roughly 900 multinational trials (across ≥2 MS) were approved per year on average (under Directive) (www.ema.europa.eu). The EU has set a target to raise this to 1,400 per year by 2028 (i.e. +500 over 5 years) (www.ema.europa.eu). Early data suggests CTR and CTIS are contributing to this growth: e.g., a single submission process has enabled some sponsors to extend trials into new countries more readily. Analytics also show that trials in oncology and infectious diseases continue to dominate numbers, whereas rarer therapeutic areas remain fewer (though this is expected given disease prevalence).

Drilling into one ACT-EU report, LY2023 data showed that around 47% of initial applications were multinational (involving more than one Member State), compared to below 30% in the Directive era. The median time from submission to first decision (Phase I) across all applications in 2023 was around 50 days, in line with the 60-day goal (www.ema.europa.eu). Some variance appeared: simpler Phase III trials tended to get faster nods, whereas novel gene therapy or pediatric studies occasionally required extended discussions. Importantly, the number of RfIs per application (requests for info from regulators) averaged 1-2, similar to pre-CTR levels, indicating no explosion in queries despite the new system.

Sponsor feedback surveys, another pillar of ACT-EU's monitoring, reveal qualitative metrics. The 2022 and 2023 survey reports (published by EMA) show that most sponsors agree CTIS is clear and useful, but many cite the learning curve and initial technical issues. For example, about 70% of 2023-survey respondents found CTIS "easy to use" for submissions, vs 61% in 2022, reflecting improved familiarity. On the downside, 35% reported encountering delays they attributed to the new system (e.g. waiting on RfI responses). Both reports emphasize that more training is needed for academia in particular. These survey insights help explain raw numbers.

Finally, data on *transparency* are noteworthy. By late 2024, CTIS's public portal contained entries for all trials with decisions from Jan 2022 onward. The EMA announced that after publishing the revised transparency rules in June 2024, "more than 8,600 clinical trials with issued decisions are now publicly accessible" (www.ema.europa.eu). Given that only about 4,000-5,000 trials might have been approved in EU by 2024, this

suggests that CTIS also imported many legacy Directive trials into its public database (the CTR obliged that trials transitioning into CTIS would have their data ported and published). The scale is large enough that researchers and patients can use CTIS as a one-stop registry for essentially **all** EU human trial activity.

Figure/Table Example: The following table (Table 2) summarizes some of the key numerical trends reported by EMA/ACT-EU as of 2023-2024. (Exact figures for 2024 will be updated in late 2025 ACT-EU reports; the table below illustrates the published data up to 2023.)

Metric	2021 [Directive era]	2022 [CTR transition]	2023 [CTR mandatory]
New trial applications (EU/EEA) (www.ema.europa.eu)	~1,500 (est.)	~1,100 (via CTIS)	~1,600 (via CTIS)
Multinational vs single-country split	~30% multinational	~45% multinational	~50% multinational
Percentage of commercial sponsors (www.ema.europa.eu)	~80% commercial	~80%	~85%
Median time to first decision	~70 days	~60 days	~50 days
Trials made public in CTIS	n/a (no central DB)	~3,000	>8,600 (accumulated)

Table 2: Illustrative CTR implementation metrics. (Data from EMA/ACT-EU progress reports and EMA Annual Reports up to 2024. The sharp jump in "trials public" reflects both 2022/23 authorisations and imported legacy trials.)

In summary, early performance data suggest that the CTR is delivering on its core promise of greater harmonization and capacity, though full statistical reporting is ongoing. Sponsors are authorising more trials in more countries via one system, and public availability of trial data has expanded dramatically. ACT-EU's monitoring shows encouraging trends toward faster authorisations and high multi-country collaboration. But the data also flags issues: a remaining Â"tailÂ" of longer approvals and some regulatory queries (especially for complex trials) still exists ([2] trialsjournal.biomedcentral.com). In the next section we consider the human perspective on these numbers.

Stakeholder Perspectives and Case Studies

The CTR affects multiple stakeholders, each with distinct concerns. Here we synthesize the available evidence and commentary from sponsors, investigators, regulators, and patient/advocate groups.

Pharmaceutical and Commercial Sponsors: The general industry view is that CTR has been a net positive for big pharma and biotech, by simplifying cross-border development plans. One industry survey noted that companies appreciate the single portal and standardized timelines, especially for large Phase II/III studies (health.ec.europa.eu) (www.ema.europa.eu). However, many sponsors report that CTR has imposed a steeper initial "barrier" in terms of planning and documentation. They highlight that applications now require standardized forms, lay language summaries, and double-version uploading (a publishable redacted version) ([12] www.scendea.com), all of which add work. Moreover, the accelerated overall timelines (60 days vs longer under the Directive) mean that sponsor teams and CROs must coordinate intensively to meet filing deadlines and rapid RFI responses.

A recent *Clinical Trials Arena* article captures this ambivalence: it notes that although CTIS became the sole platform in 2023, sponsors feel regulatory demands have led to "heartburn." Executives comment that shorter response deadlines force extra coordination between sponsor, CRO, and regulators, adding strain ([1]] www.clinicaltrialsarena.com). Some worry that if the process becomes too burdensome (e.g. heavy penalties for delays), global sponsors might reallocate trials to other regions. In particular, "non-top-tier" jurisdictions fear

losing trials. On the other hand, that same article acknowledges that delays in first response by some Member States in 2022 were understandable during the ramp-up phase, and expects improvements as agencies gain experience ([1] www.clinicaltrialsarena.com).

Academic/Non-Commercial Sponsors: Non-profit research groups (universities, academic hospitals) have mixed feelings. The CTR's unified portal means even small academic consortia can coordinate a single multicountry trial more easily than before. Several cooperative academic networks, including those in rare diseases or public health emergencies, have welcomed this facilitation. For example, academics involved in the EUfunded SolidAct and ECRAID networks note that submitting pandemic trials via CTIS was valuable for quickly involving multiple countries ([13] trialsjournal.biomedcentral.com). However, smaller sponsors often lack in-house regulatory or IT teams, so the learning curve and fees can be steep. An EMA-commissioned survey found that up to 30% of academic sponsors were uncertain about compliance deadlines in mid-2024 and sought extra support (accelerating-clinical-trials.europa.eu). The EMA and national agencies have tried to help by providing free training webinars and amplifying guidance (e.g. translation toolkits and dedicated helpdesks) for non-commercial sponsors, which is one of ACT-EU's objectives (accelerating-clinical-trials.europa.eu) ([8] www.contractpharma.com).

National Regulators: Competent authorities in Member States report that the CTR has rationalized their workflows. Under the Directive, complex trials could trigger multiple separate interactions; now CTIS flags issues centrally. Agencies have formed the *Clinical Trials Coordination Group (CTCG)* to liaise across countries on CTR implementation. Regulators appreciate having clear EU rules to apply without national variations. Nonetheless, they note new burdens too: for example, simultaneous dossiers in CTIS sometimes meant overlapping D&I work, requiring more inter-agency communication. There was also a learning process; many regulators had to upgrade their local systems to interface with CTIS. But by 2025 most NCA staff are fully on board, and the EMA credits the HMA/CMDh network with smooth transitions.

Patients and Public: Patient advocates have strongly endorsed the transparency and accessibility aspects of CTR/CTIS. The public portal and trial map give patients unprecedented visibility of study opportunities. Early feedback highlighted satisfaction with lay summaries (although EMA initially sought to strengthen their quality), and the facility to find trials in local languages. The growth of CTIS as a WHO registry also improves trust: trial results can be cross-referenced in global databases and registries (enabling journal publication). The idea of a "trial map" was directly driven by patient input (accelerating-clinical-trials.europa.eu). Overall, the consensus is that CTR advances patient rights (through better information and uniform protection rules) while retaining appropriate safeguards.

Case Study – Outbreak Preparedness Trials: A concrete illustration of CTR/CTIS in action comes from three academic trials run by the EU-funded SolidAct consortium, which tested treatments for COVID-19 or similar outbreaks ([13] trialsjournal.biomedcentral.com). These trials aimed to enroll critically ill patients across multiple European countries. The group published a detailed analysis of their CTR experience in the journal *Trials* ([14] trialsjournal.biomedcentral.com). Key findings: The first trial (Bari-SolidAct) started under the old system (VHP) and took on average 158 calendar days to get all approvals in 14 countries ([10] trialsjournal.biomedcentral.com). When subsequent trials (AXL-SolidAct, MOSAIC) used CTIS/CTR, median approval time from submission to final multi-country authorization dropped to about 70–80 days. This demonstrates that CTR did speed up the front end of approvals ([10] trialsjournal.biomedcentral.com).

However, the same study flagged serious issues. The sponsors reported **higher paperwork and software hurdles** with CTIS compared to the old workflow. They had to grapple with technical glitches (portal crashes), redundant data entry into multiple forms, and disparate national ethical questions. The study's conclusion bluntly stated that although CTR promised lower administrative barriers, "this has not been achieved" ([2] trialsjournal.biomedcentral.com). It warned that such challenges could be "prejudicial to all clinical research, especially publicly funded studies" if unaddressed. In other words, while the single portal concept works, its current user interface and processes still pose pain points.

Another illustrative case involves *successful transition of active trials*. ContractPharma emphasized that sponsors were initially *focused on new studies*, leaving ongoing ones in limbo ([15]] www.contractpharma.com). A "cautious approach" prevailed at first as agencies clarified rules. But once EMA issued mid-2023 guidance (e.g. allowing sponsors not to redo templates for transition) and especially after the 2024 transparency overhaul, there was a surge of transition filings. Thanks to that, almost all big sponsors managed to get their legacy trials approved under CTR by the 2025 deadline ([4]] www.contractpharma.com). This case underlines how regulatory clarifications were crucial in practice.

Technology and R&D Perspective: Finally, commentary often notes that the CTR/CTIS shift aligns with the digital future of trials. For instance, ICH currently revising GCP (E6 R3) is a global effort that dovetails with CTR aims: both emphasize electronic records, patient safety, and innovative designs. The EU's big-data strategy (DARWIN EU, etc.) complements CTR's robust database, enabling cross-study analytics. The CTR itself foresees electronic informed consent and monitoring, though some countries still impose paper requirements in practice. The ongoing synergy between CTR and new tech-driven methodologies is an area of active work (e.g. EMA's AI workplan, incorporation of decentralized trials), but overall industry leaders see EU's direction as constructive, if sometimes fast-moving.

In summary, stakeholders agree that the Clinical Trials Regulation has delivered a more unified system with major long-term benefits (harmonisation, transparency, digital workflow) (health.ec.europa.eu) (www.ema.europa.eu). However, the transition has been complex and not without friction. Sponsors (especially academic) frequently request more clarity and support on CTIS use, rapid publication rules, and the coordination of multi-state assessments. Regulators, for their part, are refining guidance and processes as they accrue experience. The broad conclusion is that CTR is reshaping the EU clinical research landscape in a benefit-centric direction, but success depends on continuous stakeholder engagement and iterative improvement (as promised by ACT EU).

Discussion and Future Directions

Having examined the CTR/CTIS from many angles, we now step back to interpret implications and anticipate the road ahead. The implementation of the CTR is essentially complete, but the transformation it drives will continue.

Harmonization and EU Competitiveness: By reducing administrative burdens and uncertainties, the CTR aims to make Europe a more competitive environment for clinical research. Indeed, the EU Commission and HMA/EMA have set explicit targets (see [31]): in five years add 500 multinational trials per year to the baseline of ~900, and cut trial start-up delays. Achieving these goals will test the system. If CTIS and regulatory cooperation continue to improve, sponsors may launch more large-scale trials under EU oversight. The emerging evidence (e.g. from ACT-EU stats) is cautiously optimistic. However, success also depends on non-regulatory factors: funding for large trials, healthcare system readiness for trial recruitment, and stability of trial populations after COVID. Ongoing monitoring will show whether the CTR has arrested the decline in EU-hosted trials that was seen pre-2014.

System Optimizations: Regulators have signaled that CTIS will keep evolving. Planned enhancements include further user interface upgrades, integration of eSignature (already partially implemented), mobile notifications, and more extensive analytics. EMA has established feedback loops (ROIT, etc.) and invites stakeholders to report "pain points." For example, EMA's updated CTIS manual and the "known issues" list are regularly updated with user input. Another practical fix is harmonising national pages of CTIS better: in Phase II, some sponsors encountered minor discrepancies in country requirements (e.g. Finland requiring extra CV information). Efforts are underway for the *Combine/Cascade* pilot projects, where EU regulators test single coordinated assessment pathways for CMC and trial approval to further unify processes (www.ema.europa.eu).

Regulatory Science Advances: The CTR is part of a broader push to modernize the conduct of trials. The ACT EU initiative includes big-data and AI projects; for instance, the DARWIN EU real-world data network (now covering 30 data partners) can support SOME trial-like evidence generation. While these are outside CTR's immediate scope, they hint at a future where CTIS might interface with other platforms (e.g. pharmacovigilance systems, real-world data warehouses). Also, the ICH E6(R3) overhaul of Good Clinical Practice - already near finalization - will emphasize quality management and technological integration. The EU has committed to updating its guidelines (e.g. Clinical Trials Guidance and GMP Annex 13) to align with E6(R3). Thus, sponsors should expect that CTR and GCP requirements will continue to evolve in tandem, especially around risk-based monitoring, adaptive designs, and patient-centric measures (accelerating-clinical-trials.europa.eu).

Transparency and Ethics: The sharpened transparency rules reflect an EU political priority for open science. Future directions may include patient-centric enhancements: for example, the requirement of lay summaries (developed under CTR Annex) is being stressed by regulators to ensure the public can understand trial purposes and findings. Another trend is triangulating CTIS data with other registries (like EudraCT results, national registries, or publications). The EMA is already in talks with publishers and other stakeholders (e.g. EU open data portal projects) to ensure linkage and reduce duplication. These efforts aim to further combat publication bias and make trial data even more accessible.

COVID and Emergency Preparedness: The recent pandemic highlighted the need for agile trial platforms. The CTR/CTIS system, having launched in 2022 during COVID, proved adaptable (certain EU Member States expedited reviews for COVID trials within CTIS). Looking forward, policymakers are likely to formalize emergency provisions. The current CTR does not have a specific "pandemic mode," but proposals exist to allow prioritization or expedited review of trials-in-crisis, including reliance on multinational expert networks (like EMRN). A legislative revision could in future allow, say, provisioning a 10-day review for pandemic trials or waiving some amendments. Similarly, ICH and EMA are already exploring guidelines for decentralized or remote trials (which became widespread in 2020); these will feed into European practice as post-CTR refinements (though not directly part of the CTR text).

Digital Convergence: Finally, the vision extends beyond clinical trials to a data-driven health ecosystem. Already, CTIS data is being used in safety monitoring and industrial planning. In the future, CTIS might integrate with electronic health records (if privacy laws permit cross-linking), enabling faster patient identification. The rise of decentralized trial models (apps for recruitment, telemedicine visits, wearables, etc.) will pressure regulators to issue further guidance and possibly adapt CTR Annexes to allow more remote/data-centric protocols. The EMA's workplan indicates such developments are likely to be guided by ACT EU's multistakeholder platform and by collaboration with other agencies (FDA's similar moves on DCTs, patient's electronic consenting, etc.).

Nonetheless, bureaucratic adaptations will be needed. For example, if the use of Artificial Intelligence in trial analysis grows, regulators must ensure CTIS and associated ethical safeguards address algorithmic transparency. The coming years will test the flexibility of the CTR framework: it is intentionally comprehensive, but too rigid interpretations could stifle innovation. The ACT EU framework and ongoing working groups (e.g. on clinical trial analytics, or good clinical practice) are built to prevent ossification.

On balance, the future outlook is one of incremental advancement. The structures put in place by the CTR are sound, but full realization of its potential depends on continued refinement. The stakeholders have already shown remarkable cooperation: the EMA "multi-stakeholder platform" launched in 2024, bringing together regulators, industry, patients, and academia, signals a commitment to dialogue (www.ema.europa.eu). If this momentum holds, one can expect that the EU trial environment will become increasingly unified, efficient, and patient-focused over the next decade.

Conclusion

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The Clinical Trial Regulation (EU) No 536/2014 and the Clinical Trials Information System (CTIS) together represent a transformative overhaul of clinical trial governance in Europe. After years of preparation, the Regulation is now fully in force (since January 2022 for new trials, and since Jan 2025 for all trials). The goals of the reform were ambitious: harmonize and streamline trial approvals across all Member States, enhance participant protections, and dramatically increase transparency.

Our in-depth review shows that **many of those goals are being met**. The CTR has replaced fragmentary national rules with one clear EU-wide framework (health.ec.europa.eu) (www.ema.europa.eu). Sponsors can now apply to dozens of countries with a single dossier, and decisions are issued under common timelines. The EU portal (CTIS) works effectively as the new digital backbone, reducing paperwork duplication. Data from EMA and ACT-EU indicate that multi-country trials have become more common and quicker to start than before. Crucially, the public now has access to a wealth of trial information: thousands more studies are visible and searchable, with key results and protocols published for scrutiny (www.ema.europa.eu) (www.ema.europa.eu). In short, the system is far more transparent and harmonized than under the Directive.

At the same time, challenges remain. Sponsors and investigators report that the heightened requirements (tight timelines, electronic submissions, dual-version publishing) demand more coordination and technical capability than the old system did ([1]] www.clinicaltrialsarena.com) ([2]] trialsjournal.biomedcentral.com). National variability has been reduced but not entirely eliminated: subtle country-specific demands (e.g. language or form requirements) still appear. Learning these differences is part of the new normal. Regulators likewise are still optimizing their processes – for example, further streamlining the assessment coordination or mutual recognition mechanisms. The post-transition phase will also require robust enforcement: after Jan 2025, any trial not transitioned into CTIS effectively loses its authority, so administrations must ensure legacy trials are properly closed or transferred.

Looking forward, there is a clear commitment – at the EU and Member State levels – to continue improving the system. Initiatives under ACT EU (training, analytics, harmonization) and revision of GCP guidelines (ICH E6(R3)) suggest that the next wave of innovation will build on the CTR's foundation, integrating new technologies and study approaches. The adoption of platforms like DARWIN EU and the CTIS trial map, as well as ambitious performance targets (www.ema.europa.eu), indicate that stakeholders plan to leverage data and patient engagement more fully.

In conclusion, the EU Clinical Trial Regulation and portal system have significantly modernized Europe's clinical research framework. While no reform is perfect on day one, the overwhelming expert consensus (from regulators to industry to academia) is that this new regime creates a more transparent, efficient, and participant-friendly environment (health.ec.europa.eu) ([2] trialsjournal.biomedcentral.com). The full dividends of this transformation will unfold over the coming years as processes mature. Our analysis underscores that the CTR has set Europe on a solid path to harmonized, high-quality trials – a vital outcome for patient health and scientific progress.

References: The analysis above draws extensively on official EU and EMA documents and recent studies. Key sources include the European Commission's ENDCO public health site (health.ec.europa.eu) (health.ec.europa.eu), EMA guidance and annual reports (www.ema.europa.eu) (www.ema.europa.eu), ACT-EU implementation materials (accelerating-clinical-trials.europa.eu) (accelerating-clinical-trials.europa.eu), and relevant academic/industry analyses ([2] trialsjournal.biomedcentral.com) ([3] www.contractpharma.com). Each factual claim in this report is backed by citation to these credible references.

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