The Hague Centre
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GINA Information

Methodological Notes

HCSS Datalab

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GINA Information in short

The Geopolitical Interactive Network Analysis (GINA) **Information** dashboard, developed by the HCSS Datalab in cooperation with Strategic Analysts, applies network science to examine cross-border patterns of information-based geopolitical interaction. It focuses on how cooperative and conflictual event, captured as structured interactions between actors, link states (and relevant non-state entities) through recurring relations of conflict and cooperations.

Building on the PLOVER event ontology and two complementary event-data sources, GINA Information operationalises geopolitical interactions as network ties derived from news events. It uses POLECAT for historical coverage up to the end of 2023 and complements this with HCSS's Event Data for Geopolitical Analysis and Research (EDGAR) dataset from 2024 onward. EDGAR extends the standard actor–recipient structure by enriching it with third parties and a broader event context.

The tool allows users to explore networks through interactive maps, node-link diagrams, time-series views, and summary indicators across selectable time windows, event types, and actor subsets. By separating cooperation and conflict into parallel but methodologically aligned layers, GINA Information supports systematic comparison of how collaboration and confrontation co-occur, diverge, or shift over time.

While GINA Information is built on a consistent and transparent methodological foundation, its insights remain constrained by the design and coverage of the underlying event datasets and by the limits of automated extraction from news. Reporting and media attention biases, duplication and classification noise, and actor-resolution challenges can shape observed network structures as much as real-world behaviour. Choices around aggregation, weighting, and the current emphasis on visual and exploratory analysis also simplify complex interaction dynamics. As such, the tool is intended as a conservative but analytical baseline for examining how cross-border cooperation and conflict take shape in the information environment.

1. Introduction

The contemporary geopolitical landscape is shaped not only by diplomatic signalling and military posturing, but also by the information environment in which states and other organised actors communicate, coordinate, compete, and contest narratives. Cross-border information interactions, ranging from routine consultation and public reassurance to denunciation, coercive messaging, and escalation, structure how actors perceive intentions, attribute responsibility, and mobilise support. These interactions shape both opportunities for coordination and pathways to confrontation, influencing crisis dynamics, alignment patterns, and the broader evolution of international order. To systematically analyse these informational dimensions of international relations, analytical tools are needed that move beyond isolated incidents and instead map how actors are embedded in wider systems of cooperative and conflictual interaction over time.

Figure 1 - GINA Suite overview

The Hague Centre for Strategic Studies (HCSS) has developed the GINA Series, an initiative of the HCSS Datalab in collaboration with Strategic Analysts, to apply network-science frameworks to multiple dimensions of international relations. Drawing on bespoke HCSS and publicly available datasets as shown in figure 1, GINA examines patterns, interdependencies, and power dynamics between actors across four domains: Diplomatic, Military, Economic, and Information. The present methodological note provides the conceptual and technical foundations for GINA Information and offers transparency on how the tool is constructed and should be interpreted.

GINA Information focuses on cross-border information-based interactions as they are expressed through observable geopolitical events. Rather than treating cooperation and conflict as static labels, the dashboard conceptualises them as patterned sequences of interaction that unfold through distinct modalities.[1] Using event data structured around a shared ontology, GINA Information translates these interactions into network representations in which actors are nodes and cooperative or conflictual

events form directed ties. Users can explore these networks through interactive maps, node-link diagrams, summary indicators, and time-series views across different time frames, event types, and subsets of actors, enabling comparison of how cooperative and conflictual dynamics align, diverge, or shift over time.

To operationalise these concepts, GINA Information relies on two complementary event-data sources that code interactions from international news: POLECAT for historical coverage up to the end of 2023 and HCSS's EDGAR dataset from 2024 onward.[2][3] Both are grounded in the PLOVER ontology, ensuring a consistent typology of cooperative and conflictual actions.[4] EDGAR extends the standard actor–recipient structure by including third parties that are central to the event context, allowing analysts to identify events that are relevant to an actor even when it is not the direct initiator or target. A harmonised actor standardisation layer ensures consistent representation of countries and state entities across sources and time, providing a stable node set for network construction and comparison.

This methodological note is structured to guide the reader from the conceptual foundations of information-based geopolitical interaction to the practical implementation and interpretation of the GINA Information tooling. Each section builds sequentially on the previous one, moving from theory to data, from data to network construction, and from network construction to analytical use. The structure mirrors the logic of the GINA series and is designed to make both the reasoning behind the framework and its operational choices transparent and traceable.

Section 2 introduces the conceptual foundation of GINA Information. It clarifies how the project understands geopolitical interactions based on cooperation and conflict, providing clear definitions, typologies, and analytical distinctions between these two modalities. The section outlines the principal forms, drivers, and trajectories of cooperation and conflict, emphasising their processual nature and their embeddedness in broader relational structures. By distinguishing structural, situational, and relational drivers, Section 2 provides the conceptual lens through which information-based interactions are interpreted as patterned systems rather than isolated events.

Section 3 presents the typology and data sources that underpin the GINA Information dashboard. It situates the project within the broader tradition of geopolitical event-data ontologies, from early Cold War–era efforts to more recent NLP-driven approaches. The section introduces the PLOVER ontology and explains its role in structuring cooperative and conflictual event types. It then details the two core datasets used in GINA Information – POLECAT and EDGAR – describing their scope, coverage, and respective strengths. The section concludes with an explanation of actor and country standardisation procedures, which ensure consistent representation of entities across datasets and time.

Section 4 explains how coded geopolitical events are translated into network structures. It outlines how actors become nodes, how events are represented as directed edges, and how aggregation, weighting, and temporal filtering are applied. Separate subsections describe the construction of cooperation and conflict networks, followed by a shared discussion of visual representation. This includes layout algorithms, community detection, and scaling rules, which are applied consistently across layers to ensure that observed differences reflect underlying interaction patterns rather than design choices. The

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[2] The *Poli*tical *E*vent *C*lassification, *A*ttributes, and *T*ypes (POLECAT) is a global political event dataset, which categorizes and codes events from international news sources to track political interactions, including cooperation and conflict events based on event attributes. The dataset could be considered big data big detail, due to both its high number of records (more than 12 million news reports over six years, of which 700 thousand are unique interstate interactions) and attribute coverage (95% for first category attributes such as event type, actor country intensity score, sources and 55% on secondary category attributes such as actor name, context etc.). Halterman, A., Bagozzi, B. E., Beger, A., Schrodt, P. A., & Scarborough, G. I. (2023). *PLOVER and POLECAT: A new political event ontology and dataset* (preprint). Presented at the International Studies Association Annual Convention, Montreal, Canada.

[3] Halterman, A., Schrodt, P. A., Beger, A., Bagozzi, B. E., & Scarborough, G. I. (2023). *Creating custom event data without dictionaries: A bag-of-tricks* (preprint). Presented at the International Studies Association Annual Convention, Montreal, Canada. arXiv.

[4] PLOVER: *The Political Language Ontology for Verifiable Event Records* (PLOVER) is an event classification ontology that replaces traditional systems like CAMEO by simplifying event types and improving the accuracy of coding political events based on the context, mode, and other factors.

section provides the technical basis needed to interpret the network visualisations shown in the dashboard.

Section 5 introduces the analytical and visual outputs available through the GINA Information dashboard. It demonstrates how users can interpret global- and state-level network structures to analyse patterns of alignment, contestation, centrality, and peripheralisation. The section also describes complementary visualisations, including map-based views, quantitative summaries, and time-series tools, and explains how these elements support exploratory, comparative, and temporal analysis of information-based interactions. Together, these tools allow users to move between spatial, relational, and temporal perspectives on cooperation and conflict.

Section 6 discusses the main limitations that affect how GINA Information should be interpreted. It addresses data-related constraints such as media and reporting biases, duplication, classification uncertainty, and uneven geographic coverage, as well as methodological limitations arising from aggregation choices and the current emphasis on visual and exploratory analysis. The section clarifies that while these constraints shape the precision of the outputs, they do not undermine the dashboard's value as a systematic and transparent analytical baseline. It also outlines directions for future development, including methodological refinement and expanded analytical functionality.

Taken together, this methodological note is intended to function both as a contextual foundation and as a practical guide for using the GINA Information tooling. Readers may work through the document sequentially to gain a comprehensive understanding of the framework or consult individual sections as standalone references depending on whether their primary interest lies in conceptual definitions, data provenance, network construction, or analytical application.[5]

[5] Portions of this methodological note were created with support from generative AI tools. In line with the HCSS Maxims for Responsible Use of Generative AI, the use of these tools served only to augment the analytical process, not to substitute expert judgement. All AI generated suggestions were verified for accuracy, authenticity, and integrity. Sweijs, T., Kommandeur, J., and de Ruijter, A. (2024). Augmentation, Not Substitution. HCSS Manual for the Responsible Use of Generative AI.

2. Conceptual Foundation

This section establishes the conceptual basis for the GINA information framework by clarifying how geopolitical interactions based on cooperation and geopolitical interactions based on conflict are understood and operationalised. Because both phenomena involve structured interactions among organised actors, they form complementary layers of the broader information environment that GINA seeks to analyse. Clear definitions are essential for ensuring that these interactions can be measured consistently, compared across cases, and represented accurately within a network-science approach. Section 2.1 outlines the key elements, forms, and drivers of geopolitical interactions based on cooperation, while Section 2.2 develops an equivalent foundation for geopolitical interactions based on conflict. Together, these concepts provide the groundwork for the typology in Section 3.

2.1. Cooperation

2.1.1. Definition

Cooperation refers to political events in which an actor undertakes verbal or material actions that improve, maintain, or expand relations with another actor, or that involve coordination, exchange, or mutual accommodation.[6] These interactions involve efforts to manage differences, build agreement, or realise shared interests using verbal or material means that sustain or improve relations between actors. Because cooperation relies on consent and coordination rather than force, it is distinguished from conflict by the absence of deliberate harm or coercive pressure.[7]

Cooperation occurs in a wide range of settings.[8] It may involve states negotiating agreements, consulting through diplomatic channels, or coordinating policies within multilateral institutions. It can also include material cooperation such as economic exchange, humanitarian assistance, security cooperation, or the implementation of ceasefires and withdrawals. These interactions differ in form and intensity, but they share core features: actors are organised, actions are intentional, and outcomes are oriented toward accommodation, exchange, or joint gain rather than exclusion or harm.

Cooperative relationships often emerge from prior tensions, evolve through repeated interactions, and adapt as actors reassess interests and constraints. Agreements may follow prolonged negotiations, confidence-building measures may precede deeper collaboration, and material cooperation may consolidate earlier verbal commitments. A peace process that advances through consultations, concessions, and the implementation of agreed measures illustrates how cooperation develops incrementally rather than instantaneously.

This definition provides a foundation for analysing cooperative political events in a systematic way. By emphasising organised actors, intentional action, and the pursuit of compatible objectives through non-coercive means, it distinguishes cooperation from both violent conflict and purely rhetorical alignment, and aligns directly with the forms of cooperative interaction examined in the sections that follow.

2.1.2. Forms of Cooperation

Cooperation between actors can take different forms depending on the purpose of the interaction, the actors involved, and the level of commitment between them. For analytical clarity, the following forms

[6] Axelrod, Robert. 1984. *The Evolution of Cooperation*. New York: Basic Books. http://www.loc.gov/catdir/enhancements/fy0831/83045255-d.html.
[7] Berenskoetter, Felix, and M.J Williams. 2007. *Power in World Politics*. London [etc: Routledge. http://catdir.loc.gov/catdir/toc/ecip0711/2007006058.html.
[8] Fearon, James D. 1998. "Bargaining, Enforcement, and International Cooperation." *International Organization* (New York, USA) 52 (2): 269–305.

are distinguished within GINA information: *Agree, Consult, Support, Concede, Cooperate, Aid, and Retreat.* These forms are taken from the PLOVER ontology, which will be further discussed in Section 3: PLOVER defines geopolitical cooperation, as it does for conflict, both on a verbal and material form.

Verbal Cooperation:

- **Agree**: Citing the PLOVER manual: "*Agree to, offer, promise, or otherwise indicate willingness or commitment to cooperate, including promises to sign or ratify agreements.*"[9]
- **Consult**: Citing the PLOVER manual: "*All consultations and meetings: this includes visiting and hosting visits, as well as meeting at a neutral location, and consultation by phone or other media.*" Because this type of political event is both frequent and easily (and safely. . .) covered in the international press, it is the largest category in most event datasets."[10]
- **Support**: Citing the PLOVER manual: "*Initiate, resume, improve, or expand diplomatic, non-material cooperation; express support for, commend, approve policy, action, or actor, or ratify, sign, or finalise an agreement or treaty*."[11]
- **Concede**: Citing the PLOVER manual: "*This covers verbal concessions which have no immediate material consequences, including the promise of future concessions such easing of administrative or legal restrictions on persons and organisations, removing curfews, suspending protests, and declarations (but not implementations) of ceasefires and withdrawals from territory*"[12]

Material Cooperation:

- **Cooperate**: Citing the PLOVER manual: "*Initiate, resume, improve, or expand mutual material cooperation or exchange, including: Initiate, resume, improve, or expand economic exchange or cooperation; military exchanges such as joint military games and manoeuvres; cooperation on judicial matters, such as extraditions and war crimes; voluntary exchanges or sharing of intelligence and other significant information*."[13]
- **Aid**: Citing the PLOVER manual: "*All provisions of providing material aid whose material benefits primarily accrue to the recipient. Examples include monetary aid and financial guarantees, grants, gifts and credit, including reparations; military and police assistance including arms and personnel; humanitarian aid such as emergency assistance; asylum, both to persons in its territories (territorial asylum) and diplomatic asylum on the premises of an embassy*."[14]
- **Retreat**: Citing the PLOVER manual: *"Retreat covers any events—not just military "retreat" from territory—which have an immediate (not simply promised) material consequences, such as the release of prisoners and hostages, repatriation of refugees, the return of confiscated property, allowing the entry of observers, peacekeepers, or humanitarian workers, disarming, observing a ceasefire or otherwise ending active conflicts, and, of course, a military retreat from, or ceding, territory. Retreat also covers resignations of government officials*."[15]

2.1.3. Causes and Drivers

Cooperation in geopolitical incidents is shaped by the interaction of structural, situational, and relational drivers. These factors do not determine cooperation on their own, but together they influence where cross-border capital flows, how investment relationships form, and how they evolve over time.[16]

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[9] Open Event Data Alliance. 2024. *PLOVER: Political Language Ontology for Verifiable Event Records*. Version 2.0. Open Event Data Alliance. 9
[10] Ibid, 10.
[11] Ibid, 11.
[12] Ibid, 12.
[13] Ibid, 13.
[14] Ibid, 14.
[15] Ibid, 15
[16] Tilly, Charles. 2001. "Mechanisms in Political Processes." *Annual Review of Political Science* 4 (1): 21–41. https://doi.org/10.1146/annurev.polisci.4.1.21.

Structural drivers are long-term conditions that shape actors' incentives and constrain their choices over long periods. Institutional frameworks, power distributions and interdependence, norms and legal constraints, and domestic political structures all play into the ability for actors to cooperate in geopolitics. As an example, countries with larger and more established transnational institutional frameworks (for example the EU), are more likely to engage in cooperation.

Situational drivers are short-term conditions or shocks that alter incentives in specific moments. These can include shared threats or external shocks, cost-benefit recalculations, windows of opportunity (which can range from leadership changes to emergency diplomatic summits), and information and uncertainty reduction measures.

Relational drivers concerns how cooperation is embedded in regional and international networks. This can range from trust and credibility built through past interactions, reciprocity and reputation, communication channels and routinised contact, and social and identity ties. Countries that have a history of cooperating together are naturally more likely to cooperate more in the future. However, it should be noted that given the often highly personal nature of diplomacy on the world stage, such relational drivers can quickly be overturned, i.e. following a dramatic change in leadership.

2.1.4. **Dynamics and Trajectories**

Cooperation in geopolitical interactions develops as a process unfolding over time, rather than as a single event. It often begins with low-intensity forms such as a handshake at a diplomatic forum and may intensify through the introduction of cooperative measures, resulting in more intense cooperation; from joint statements, all the way to established and institutional cooperation in the form of military alliances or expansive trade agreements. This happens as actors reevaluate interests, capabilities, and constraints. Escalation can broaden the scope of cooperation across diplomatic, economic, and security domains, while repeated interaction may generate path dependencies that stabilise cooperative positions.

Cooperation trajectories do not necessarily culminate in stable partnership or lasting agreement. Periods of intensified cooperation are frequently followed by stagnation, partial rollback, or reversion to limited and issue-specific coordination, in which cooperation persists but remains constrained, conditional, or reversible. Some cooperative processes deepen through institutionalisation, repeated interaction, and the gradual alignment of interests, while others dissipate once immediate incentives fade or underlying incompatibilities reassert themselves. Analysing these trajectories is essential for distinguishing short-lived cooperative responses from sustained patterns of geopolitical coordination.

2.1.5. **Analytical Purpose**

Taken together, these conceptual foundations clarify what geopolitical cooperation is, how its principal forms differ, and which factors shape its emergence, consolidation, and erosion over time. They provide the analytical basis for understanding cooperation not as isolated acts of goodwill or ad hoc coordination, but as a system of structured interactions among state and non-state actors operating across borders. Cooperation is thus conceptualised as a patterned process that unfolds through varying modalities, and across different degrees of depth and durability.

Section 3 will translate these concepts into an operational typology and an event-based, network-oriented framework underpinning the GINA Information Cooperation Dashboard. This approach represents actors as interconnected nodes and cooperative interactions as links, allowing patterns of consultation, agreement, assistance, coordination, and implementation to be analysed as dynamic networks. By doing so, GINA Information enables systematic comparison of cooperative relationships across actors, regions, and time periods, and supports the analysis of how cross-border cooperation structures emerge, stabilise, fragment, or transform over time.

2.2. Conflict

2.2.1. **Definition**

Conflict refers to political events in which an actor undertakes verbal or material actions that deteriorate, weaken, or reduce relations with another actor or that involve opposition, obstruction, coercion, or the withdrawal of coordination, exchange, or mutual accommodation. These interactions involve efforts to exploit or exacerbate differences, resist agreement, or pursue incompatible interests through verbal or material means that weaken or damage relations between actors. Because conflict relies on coercion, pressure, or the threat or use of harm rather than consent and coordination, it is distinguished from cooperation by the presence of deliberate harm or coercive pressure.[17]

Conflict occurs across a wide range of settings. It may involve states engaging in confrontational diplomacy, issuing threats, imposing sanctions, or pursuing opposing policies within bilateral or multilateral arenas. It can also include material forms of conflict such as the use of force, cross-border violence, coercive economic measures, or the breakdown of ceasefires and agreements. These interactions differ in form and intensity, but they share core features: actors are organised, actions are intentional, and outcomes are oriented toward exclusion, pressure, or harm rather than accommodation, exchange, or joint gain.

Conflictual relationships often emerge from unresolved disagreements, intensify through repeated confrontational interactions, and evolve as actors reassess interests, capabilities, and constraints. Escalation may follow failed negotiations, coercive measures may replace earlier attempts at dialogue, and material confrontation may follow the collapse of prior verbal commitments. A conflict trajectory marked by threats, retaliation, and the progressive use of coercive instruments illustrates how conflict develops incrementally rather than erupting instantaneously.[18]

This definition provides a foundation for analysing conflictual political events in a systematic way. By emphasising organised actors, intentional action, and the pursuit of incompatible objectives through coercive or harmful means, it distinguishes conflict from both cooperative interaction and purely rhetorical disagreement, and aligns directly with the forms of conflictual interaction examined in the sections that follow.

2.2.2. **Forms of Conflict**

Conflict between actors can take different forms depending on the level of hostility, the instruments employed, and the degree of escalation involved. For analytical clarity, the following forms are distinguished within GINA information: *Request, Reject, Threaten, Accuse, Sanction, Protest, Mobilise, Coerce, and Assault*. These forms are derived from the PLOVER ontology, which conceptualises geopolitical conflict, like cooperation, as occurring across both verbal and material dimensions. Verbal conflict captures antagonism expressed through communication, diplomatic pressure, or administrative measures, whereas material conflict reflects physical actions, enforcement, or violence.

Verbal Conflict:

- **Request:** Citing the PLOVER manual: "*Request covers demands, appeals, or calls for action directed at another actor.*" Within the conflict framework, requests become conflictual when they involve pressure, ultimatums, or confrontational diplomatic demands rather than cooperative

[17] Gyula Csurgai, 'The Main Components of Geopolitical Analysis', in *Geopolitics and International Relations* (Brill Nijhoff, 2021), https://doi.org/10.1163/9789004432086_003.
[18] Paul Reuber, 'Conflict Studies and Critical Geopolitics – Theoretical Concepts and Recent Research in Political Geography', *GeoJournal* 50, no. 1 (2000): 37–43, https://doi.org/10.1023/A:1007155730730.

negotiation. These events signal dissatisfaction and may precede more escalatory actions if ignored or rejected.[19]

- **Reject:** Citing the PLOVER manual: "*Reject includes refusal to cooperate, denial of requests, or refusal to meet or negotiate*." This form represents explicit diplomatic opposition, such as rejecting agreements, dismissing proposals, or publicly refusing engagement. Rejections often mark a breakdown in dialogue and a shift from negotiation toward adversarial interaction.[20]
- **Treaten:** Citing the PLOVER manual: "*Threaten refers to statements indicating intent to impose sanctions, restrict relations, use force, or otherwise punish another actor.*" Threats constitute a higher level of verbal conflict because they introduce the possibility of material escalation, including economic punishment, diplomatic isolation, or military action.[21]
- **Accuse:** Citing the PLOVER manual: "*Accuse covers allegations, condemnations, and investigations into wrongdoing*." This category captures information and narrative conflict, including public criticism, accusations of human rights abuses, corruption allegations, and disinformation campaigns intended to undermine an opponent's legitimacy or credibility.[22]
- **Sanction:** Citing the PLOVER manual: "*Sanction includes punitive administrative or policy actions such as expulsion, withdrawal, or restriction*." Although sanctions may produce tangible consequences, they are classified as verbal conflict because they originate from institutional decisions rather than direct physical force. Examples include trade embargoes, diplomatic expulsions, financial restrictions, and suspension of agreements.[23]

Material Conflict:

- **Protest:** Citing the PLOVER manual: "*Protest includes demonstrations, strikes, riots, and other collective actions*." Within cross-border conflict, this category captures social conflict expressed through civilian mobilisation, such as demonstrations targeting foreign embassies, cross-border boycotts, or disruptive protests affecting international relations.[24]
- **Mobilise:** Citing the PLOVER manual: "*Mobilise refers to the gathering or deployment of forces, resources, or capabilities.*" Mobilisation signals escalating tension through physical preparation rather than direct violence, including troop deployments, military exercises, or logistical positioning intended as shows of force.[25]
- **Coerce:** Citing the PLOVER manual: "*Coerce covers enforcement actions that restrict, arrest, detain, or otherwise compel behavior*." This includes administrative repression, curfews, territorial restrictions, or cyber operations targeting infrastructure. Coercive actions reflect the application of power without necessarily entering open warfare.[26]
- **Assault:** Citing the PLOVER manual: "*Assault includes all forms of physical violence*." This represents the highest level of conflict intensity and encompasses both conventional and irregular warfare. Regular conflict involves sustained attacks between organised military forces using heavy weaponry or coordinated operations, whereas irregular conflict includes terrorism, guerrilla tactics, assassinations, and attacks using unconventional means.[27]

2.2.3. Causes and Drivers

Conflict in cross-border political incidents is shaped by the interaction of structural, situational, and relational drivers. In political sociology, conflict is not treated as an anomalous breakdown of order but

[19] Open Event Data Alliance. 2024. *PLOVER: Political Language Ontology for Verifiable Event Records*. Version 2.0. Open Event Data Alliance. 11
[20] Ibid, 12.
[21] Ibid, 13.
[22] Ibid, 14.
[23] Ibid, 15.
[24] Ibid, 16.
[25] Ibid, 17.
[26] Ibid, 18.
[27] Ibid, 19.

as a patterned form of social interaction that emerges from the organisation of interests, authority, and scarcity, and then develops through sequences of interaction.These drivers do not produce conflict mechanically; rather, in combination they influence where antagonistic alignments form, how coercive instruments are selected, and how contention escalates or stabilises over time.

Structural drivers emphasise how the distribution of resources, authority, and status across actors shapes enduring patterns of antagonism. Conflict becomes more likely where access to valued goods is unequal, where authority relations generate durable oppositions, or where institutional arrangements privilege some actors while constraining others.[28] In cross-border settings, such structural pressures include asymmetric dependence, contested hierarchies, and international rules that allocate voice, veto, or enforcement capacity unevenly. These conditions produce persistent incompatibilities that are reflected in repeated patterns of opposition, signalling, and coercive interaction, even in the absence of open violence. From an information perspective, structural drivers shape which actors can credibly issue threats, set agendas, or frame disputes, and they help explain why some conflictual relationships recur systematically over time.

Situational drivers focus on conjunctures that activate or intensify latent tensions in specific moments. Triggering events, perceived threats, sudden shifts in opportunity, or breakdowns in routine governance and communication can prompt actors to reinterpret constraints and recalibrate strategies under uncertainty. Such moments often produce bursts of verbal confrontation, signalling failures, or rapid escalation from rhetoric to coercive action. In cross-border incidents, situational drivers are visible in short-term spikes in conflictual events following shocks such as security incidents, abrupt policy changes, or failed negotiations. These dynamics underline how conflict evolves as an interactional process, in which information flows, misperceptions, and time pressure shape the pace and direction of escalation.

Relational drivers foreground how conflict is embedded in the history and quality of ties between actors. Patterns of trust and distrust, prior grievances, reputational assessments, and repeated interaction structure expectations about likely behaviour and acceptable strategies. In this view, conflict is itself a social relationship rather than merely the negation of cooperation. Over time, recurring confrontations can normalise hostile signalling, harden identities, and stabilise antagonistic alignments, producing enduring rivalry structures within the international system. At the same time, established relationships also create channels through which conflict may be managed or contained. In network terms, relational drivers are reflected in persistent dyads, clustered patterns of hostility, and the mobilisation of solidarity or enmity across connected actors, linking state and non-state participants within broader conflict networks.[29][30]

2.2.4. **Dynamics and Trajectories**

Conflict in cross-border political interactions develops as a process unfolding over time, rather than as a single event. It often begins with low-intensity forms such as disagreement or diplomatic confrontation and may intensify through the introduction of coercive measures or violence as actors reassess interests, capabilities, and constraints. Escalation can broaden the scope of conflict across diplomatic, economic, and security domains, while repeated interaction may generate path dependencies that stabilise antagonistic positions. [31]

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[28] 'Horizontal Inequalities and Conflict: Understanding Group Violence in Multiethnic Societies | Springer Nature Link', accessed 3 February 2026, https://link.springer.com/book/10.1057/9780230582729.
[29] Barbara Tint, 'Constructive Conflicts: From Escalation to Resolution - by Louis Kriesberg', *Peace & Change*, ahead of print, 1 January 2008, https://doi.org/10.1111/J.1468-0130.2008.00525.X.
[30] Reinhard Bendix (Translators) Georg Simmel (Author) and Kurt H. Wolff, *Conflict and The Web of Group-Affiliations*, with Internet Archive (The Free Press, 1969), http://archive.org/details/conflictwebofgro0000rein.
[31] Friedrich Glasl, 'The Process of Conflict Escalation and Roles of Third Parties', in *Conflict Management and Industrial Relations*, ed. Gerard B. J. Bomers and Richard B. Peterson (Springer Netherlands, 1982), https://doi.org/10.1007/978-94-017-1132-6_6.

Conflict trajectories do not necessarily culminate in war. Periods of escalation are frequently followed by containment or consolidation, in which conflict settles into enduring but managed forms characterised by persistent tension, limited coercion, or episodic flare-ups.[32] Some conflicts de-escalate through negotiated adjustment or the withdrawal of coercive instruments, while others transform into alternative modalities of contention. Analysing these trajectories is essential for distinguishing transient incidents from sustained patterns of cross-border conflict.[33]

2.2.5. **Analytical Purpose**

Taken together, these conceptual foundations clarify what cross-border conflict is, how its principal forms differ, and which factors shape its emergence, evolution, and transformation over time. They provide the analytical basis for understanding conflict not as isolated incidents of violence or coercion, but as a system of structured interactions among state and non-state actors operating across borders. Conflict is thus conceptualised as a patterned process that unfolds through varying modalities: diplomatic, economic, irregular, and military, and across different levels of intensity.

The following sections translate these concepts into an operational typology and an event-based, network-oriented framework underpinning the GINA Information tool. This approach represents states as interconnected nodes and conflictual interactions as links, allowing patterns of disagreement, coercion, violence, and escalation to be analysed as dynamic networks. By doing so, GINA Information enables systematic comparison of conflict relationships across state borders, regions, and time periods, including different actors, and supports the analysis of how cross-border conflict structures form, persist, and change over time.

[32] Paul Pierson, 'Increasing Returns, Path Dependence, and the Study of Politics', *The American Political Science Review* 94, no. 2 (2000): 251–67, https://doi.org/10.2307/2586011.
[33] Gary Goertz and Paul F. Diehl, 'Enduring Rivalries: Theoretical Constructs and Empirical Patterns', *International Studies Quarterly* 37, no. 2 (1993): 147–71, https://doi.org/10.2307/2600766.

3. Typology and Data Sources

This section establishes the typological and empirical foundation of GINA Information by detailing how geopolitical events are categorised, sourced, and harmonised for analysis. Because the dashboard represents cooperation and conflict as networks of observable interactions, the choice of event ontology, data source, and standardisation procedure is central to ensuring that these interactions are coded consistently, compared across cases, and translated reliably into network structures. Section 3.1 situates GINA Information within the evolution of geopolitical event-data ontologies and describes the PLOVER framework that underpins the classification of events. Sections 3.2 and 3.3 describe the POLECAT and EDGAR datasets, outlining their methodological approaches, scope, and complementary roles within the tool. Sections 3.4 and 3.5 then clarify data coverage and actor standardisation.

3.1. Geopolitical Event Ontologies

Efforts to categorise geopolitical events under a defined structure sparked during the cold-war. McClelland's WEIS (launched in 1976) and Azar's COPDAB (launched in 1982) were the first event-data ontologies. Both were focused on state interactions, meaning all events between individuals were treated as occurring between the states of each individual's respective citizenship.

WEIS and COPDAB fell short when it came to analyse intra-state events and their event classifications were considered too narrow. Efforts to account for domestic interactions and extend the granularity of the classifications led to the creation of new frameworks such as PANDA (launched in 1988).

In the early 2000s, CAMEO (launched in 2002) and IDEA (launched in 2003) were developed to modernise event coding. The former concentrated on disambiguating WEIS terms to enhance machine-readability, while the latter focused on extending event classifications. These frameworks facilitated the creation of vastly larger datasets, most notably ICEWS (launched in 2008) and the GDELT Project (launched in 2014). Unlike earlier efforts that relied on limited wire services, these projects achieved a scale two orders of magnitude greater than their predecessors by automating the ingestion of millions of stories from a comprehensive network of international and local news sources.[34] Alongside these automated initiatives, expert-curated conflict datasets such as ACLED and UCDP emerged as complementary standards for structured political violence data, emphasising manual validation, clear definitional thresholds, and fine-grained actor coding.[35][36]

Advancements within Natural Language Processing (NLP) techniques increased the efficiency of automated extraction of event data and the accuracy of its classification, given the capabilities of Language Models to infer information from context. PLOVER was developed in 2016 to enhance CAMEO with a more concise set of event types and to include contextual information about the event and the actors involved.

3.2. POLECAT dataset

The POLECAT dataset operationalises the PLOVER event ontology by providing systematically coded geopolitical event data covering the period from 2018 to 2024. Its primary contribution to GINA

[34] Jay Yonamine, 'A Guide to Event Data: Past, Present, and Future', *All Azimuth: A Journal of Foreign Policy and Peace*, 1 January 2016, https://www.academia.edu/128758723/A_Guide_to_Event_Data_Past_Present_and_Future.

[35] Armed Conflict Location & Event Data Project (ACLED), Raleigh, Clionadh. 2010. *Introducing ACLED: An Armed Conflict Location and Event Dataset*. Journal of Peace Research.

[36] Uppsala Conflict Data Program (UCDP), Pettersson, Therese & Magnus Öberg. 2020. *Organized Violence, 1989–2019*. Journal of Peace Research.

Information lies in the empirical extraction, classification, and structuring of events from large-scale news data.

Methodologically, POLECAT departs from earlier dictionary-based approaches by employing BERT-based transformer models to identify events, actors, and interaction types directly from natural-language news text. This enables higher recall across diverse sources while maintaining a consistent mapping to the PLOVER ontology.

For analytical aggregation, POLECAT organises PLOVER's 16 root event categories into a Quad Category variable, which groups events into four interaction modes: Verbal Cooperation, Material Cooperation, Verbal Conflict, and Material Conflict. This variable provides a compact representation of event polarity and intensity that is well suited for time-series analysis and network construction, mirroring the underlying conceptual distinctions established in Section 2.[37]

Regarding entity resolution, POLECAT relies on external knowledge graphs such as Wikidata to normalise actor identities across events.[38] This allows state actors, non-state actors, corporations, and political organisations to be represented consistently within a single interaction space. Spatially, POLECAT applies sub-national geocoding, assigning events to specific cities or administrative regions when available rather than defaulting to national-level attribution.

3.3. EDGAR dataset

The main shortcomings of POLECAT dataset regard the presence of several duplicated events, and the accuracy of classical transformer models like BERT. State-of -the-art Large Language Models (LLMs) offer promising solutions to these issues. To this end, HCSS has developed *Event Data for Geopolitical Analysis and Research* (EDGAR) dataset which is the main source of data for GINA Information.[39]

Like POLECAT, EDGAR is based on the PLOVER ontology but it extends it with a more flexible structure. EDGAR leverages LLMs to extract contextual information relevant to the event from news data, and summarise it in an event description. Then, it classifies the event under the PLOVER event structure and assigns an event type. While PLOVER only defines two types of involved parties, actors and recipients, EDGAR includes third parties, which are all geopolitical entities that are part of the event context but do not take part to the core action of the event. For example, if agent A *accuses* agent B of attacking agent C, agent C is neither the actor nor the recipient of the action of accusing, but is fundamental in the context of the event.

This is a significant enhancement to the ontology for two reasons: first, on a user perspective, analysts are able to look for event that do not made or received by a country directly but that it's still relevant to it. Secondly, it serves as a starting point for a new form of geopolitical structures that leverage hypergraph structures.
Data Overview

3.3.1. Coverage

GINA information isolates 614,954 unique dyadic interstate event relations from POLECAT, ranging from January 2018 to December 2023, and it combines it with 137,205 EDGAR events ranging from January 2024 to December 2025, with data collection ongoing.

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[37] Andrew Halterman et al., 'PLOVER and POLECAT: A New Political Event Ontology and Dataset', rm5dw_v1, preprint, SocArXiv, 3 April 2023, https://doi.org/10.31235/osf.io/rm5dw.

[38] Wikidata contributors. (2025, June 5). *Wikidata: Introduction*. In *Wikidata*.

[39] The aggregated *Event Data for Geopolitical Analysis and Research (EDGAR)* dataset is currently available via GINA information. Weekly geopolitical event datasets will be published later in 2026 at www.edgar.app.hcss.nl.

Table 1 shows how the transition from POLECAT to EDGAR correlates with a significant reduction in the number of events. In general, coverage in these datasets fluctuates depending on the intensity of geopolitical discourse. This is visible, for example, in the coverage for 2020 – the lowest in the POLECAT time range – when the surge of the COVID-19 pandemic caused news outlets to place a stronger focus on internal politics and debates. In contrast, the reduction in coverage starting in 2024 can be traced to EDGAR's stricter inclusion criteria and deduplication techniques for its geopolitical events. EDGAR also aggregates information from 1,799 unique news sources compared to POLECAT's 304.

Table 1 - Events coverage

	POLECAT							EDGAR		
Year	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**Average**	**2024**	**2025**	**Average**
Events/Year	109,862	99,533	88,425	95,624	109,860	111,650	**102,492**	67,825	69,380	**68,603**
Events/Day	301	273	242	262	301	306	**281**	186	190	**188**
Events/Week	2,113	1,914	1,700	1,839	2,113	2,147	**1,971**	1,304	1,334	**1,319**
Events/Month	9,155	8,294	7,369	7,969	9,155	9,304	**8,541**	5,652	5,782	**5,717**

3.3.2. Events distribution

Shifts in the distribution of different event types also depend on either shifts in geopolitical discourse and dynamics or the structural differences of the two datasets: an example of the former is the visible increase in ASSAULT events following Russia's invasion of Ukraine in 2022, or the share of SANCTION events going from 5% to almost 9% between 2024 and 2025 – an event type that includes the imposing of sanctions.

At the same time, there are visible differences between EDGAR and POLECAT: in general, EDGAR has a more even distribution of event types, with a more balanced representation across lower frequency event types. The two datasets are more comparable in Conflict event types, while in Cooperation events they show significant shifts. For example, Table 2 shows how POLECAT favours material cooperation (AID) while EDGAR mostly identifies verbal cooperation (CONSULT) events. It is plausible, however, that most reported geopolitical cooperative interactions are verbal, such as state leader talks, visits, international gatherings' discourse etc. In this sense, POLECAT either misses or mislabels such interactions given that CONSULT type is lower than 1%.

Table 2 - Distribution of Cooperation events[40]

	POLECAT							EDGAR		
Year	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**Average**	**2024**	**2025**	**Average**
CONSULT	0.39%	0.47%	0.42%	0.18%	0.18%	0.20%	**0.30%**	23.54%	28.30%	**25.86%**
AID	21.47%	21.30%	22.56%	27.93%	24.56%	25.24%	**23.84%**	5.78%	4.40%	**5.02%**
AGREE	0%	0%	0%	0%	0%	0%	**0%**	8.11%	10.66%	**9.54%**
RETREAT	3.81%	4.05%	4.43%	4.36%	4.59%	4.40%	**4.27%**	0.60%	0.87%	**0.74%**
SUPPORT	0%	0%	0%	0%	0%	0%	**0%**	2.35%	2.28%	**2.31%**
CONCEDE	1.79%	1.76%	1.75%	1.86%	2.29%	1.82%	**1.88%**	0.53%	1.06%	**0.80%**
COOPERATE	0.56%	0.59%	0.47%	0.53%	0.54%	0.55%	**0.54%**	1.92%	1.42%	**1.67%**

[40] The POLECAT dataset as provided by Harvard Dataverse does not include AGREE and SUPPORT event types. The data refers to the isolated state-level unique dyadic interactions.

Table 3 - Distribution of Conflict events

	POLECAT							EDGAR		
Year	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**Average**	**2024**	**2025**	**Average**
ACCUSE	24.68%	24.27%	23.87%	22.48%	22.00%	21.05%	**23.02%**	16.83%	15.34%	**16.09%**
ASSAULT	11.34%	9.64%	11.91%	8.82%	13.98%	17.51%	**12.35%**	17.43%	10.15%	**13.54%**
REQUEST	12.09%	12.81%	11.70%	12.91%	11.08%	11.00%	**11.90%**	10.40%	9.30%	**9.79%**
THREATEN	10.47%	10.45%	9.43%	7.51%	8.57%	6.32%	**8.76%**	2.53%	3.43%	**3.13%**
SANCTION	5.49%	6.14%	6.03%	6.15%	5.72%	4.59%	**5.65%**	5.18%	8.99%	**7.14%**
COERCE	4.60%	5.16%	4.58%	4.62%	4.01%	4.30%	**4.53%**	1.64%	1.19%	**1.46%**
PROTEST	2.23%	2.20%	1.89%	1.88%	1.68%	2.03%	**1.99%**	0.42%	0.17%	**0.29%**
MOBILISE	0.99%	1.01%	0.88%	0.73%	0.76%	0.97%	**0.89%**	1.53%	1.12%	**1.35%**
REJECT	0.09%	0.13%	0.09%	0.04%	0.04%	0.03%	**0.07%**	1.20%	1.32%	**1.27%**

3.4. Countries Standardisation

To ensure consistency across datasets and prevent mismatches in naming or country definitions, the GINA series uses an internal reference table as the master standard for all country and state entities. In GINA Information, the POLECAT dataset was parsed and all country entries were automatically matched to this reference; ambiguous or unmatched cases were resolved through manual verification. The table links a unique numeric identifier to a harmonised country name that is used across all pages, charts, and network components. EDGAR dataset implements this standardisation by nature. is harmonisation step ensures that actors are represented consistently across time and across data sources, and establishes a coherent actor base before network construction begins.

4. Network Construction

This section describes how GINA Information translates event-level interaction data into two complementary relational network layers that capture distinct dimensions of interstate relations. Both the conflict and cooperation networks are built from the same underlying data infrastructure and follow identical construction rules, differing only in the type of events they represent. Section 5.1 details the shared data foundation and methodological approach. Section 5.2 outlines the conflict network's specific event filtering. Section 5.3 describes the cooperation network's specific event filtering. Section 4.4 visualises the shared visual logic applied across both layers.

4.1. Conflict Network

Both the conflict and cooperation networks are constructed from the same event-level datasets and follow identical translation procedures from raw event data to network structure.

Node Set. Nodes represent all actors appearing in the filtered events dataset as either actors (entities initiating actions) or recipients (entities receiving actions). Coverage follows the dataset's actor list with the naming standardisation described in Section 3.5, producing an actor-level network consistent with the geographical definitions used across the GINA series. Only actors that participated in at least one event of the relevant type (conflict or cooperation) during the selected temporal period are included in the node set.

Node Aggregation and Weighting. Node size reflects the total outgoing activity of each actor, calculated as the sum of all events initiated by that actor (outgoing edges only). Actors that are highly active as initiators appear larger in the visualisation. This sizing approach emphasises the proactive dimension of international behaviour, highlighting which actors most frequently initiate actions regardless of how often they receive actions from others.

Event-to-Edge Translation. Each filtered event record becomes a directed interaction between two actors. Direction follows the action logic defined in the data structure: edges run from the actor (the entity initiating the action) to the recipient (the entity receiving that action). An event initiated by State A against State B creates a directed edge from State A to State B. Records lacking complete dyadic information or representing self-directed events are excluded from network construction.

Edge Aggregation and Weighting. All conflict event records for the same ordered actor pair within the selected time period are aggregated into a single directed edge. Edge weight equals the cumulative number of conflict events between that pair across all years in the selection. Multiple events between the same actors, whether in different incidents or different years, all contribute to the relationship weight. This aggregation reveals the sustained intensity of conflictual relationships, distinguishing between isolated incidents and patterns of repeated hostile engagement over time.

Temporal Selection. Temporal filtering occurs before graph construction. Users may select a single year or a multi-year interval, and all events within the chosen period are aggregated into the network. When a single year is chosen, edge weights reflect that year's activity. When a multi-year period is selected, edge weights represent the total number of events across the entire interval, providing a cumulative view of sustained relationships.

Threshold Filtering. Users may apply a minimum event threshold to focus on substantive relationships. Only actor pairs with cumulative event counts meeting or exceeding the threshold appear in the visualisation. In global mode (viewing all actors), the default threshold is set to 10 events to reduce visual clutter and highlight significant patterns. In state mode (viewing specific selected countries), the default threshold is set to 1 event to capture all interactions involving the selected actors. This dual threshold

mechanism allows for cleaner visualisations while ensuring relevant relationships are displayed based on the analytical scope.

Regional Filtering. When in global mode, users may apply geographic filters to focus on actors from specific world regions (Africa, Americas, Asia, Europe, Northern America, or Oceania). Regional classification follows the UN Statistics Division (UNSD) regional groupings described in Section 3.5. When a region filter is active, only actors from that region appear in the network, along with their relationships. This filtering enables regional pattern analysis while maintaining the network's structural integrity.

4.2. Visual Representation

Both conflict and cooperation networks employ identical visual logic to ensure that structural differences between networks reflect the underlying interaction patterns rather than presentation choices. The layout algorithm and node colouring mechanisms are consistent across both layers, providing a basis for direct comparison between conflict and cooperation structures.

Layout algorithm. Nodes are positioned using a ForceAtlas2-based force-directed layout algorithm. This algorithm places actors closer together when they share strong or frequent interactions and farther apart when their ties are weaker or absent. This creates a structural map where clusters emerge naturally from interaction patterns: actors involved in many interactions tend to appear near network centres or in dense clusters, while those with fewer interactions move toward network peripheries. Because both layers use the same layout rules, differences in network structure stem from the underlying relationships rather than from the visual method itself.

Node colouring. Users can optionally colour nodes by communities or geographic regions. Community detection uses a greedy modularity algorithm, which groups actors that are more closely connected to one another through their interactions than to the rest of the network. Geographic region colouring is based on world regions classified by GINA's country harmonisation described in Section 3.5. Using consistent colouring approaches across both networks ensures that visual patterns reflect the structure of each network rather than predefined presentation choices.

Edge Directionality and size. Both networks use directed edges, with arrow directionality indicating the flow of action from actor (initiator) to recipient. Edge thickness represents the cumulative number of events between each actor pair, with thicker edges indicating more frequent or sustained interactions. This visual encoding allows immediate identification of both the most active relationships and the predominant direction of actions within each network structure. The parallel use of directed edges in both networks reflects the inherently asymmetric nature of both hostile and cooperative actions, distinguishing these event-based networks from symmetric relationship structures such as voting alignment networks.

Table 2: Summary of Network Construction Choices in GINA Information

Feature	Conflict Layer	Cooperation Layer
Underlying Data	POLECAT (≤2023) and EDGAR (≥2024) event datasets filtered to VERBAL CONFLICT and MATERIAL CONFLICT quad classes	POLECAT (≤2023) and EDGAR (≥2024) event datasets filtered to VERBAL COOPERATION and MATERIAL COOPERATION quad classes
Nodes	All state and non-state actors appearing as actors or recipients in conflict events during selected period	All state and non-state actors appearing as actors or recipients in cooperation events during selected period
Edges	Bilateral conflict events; each event record creates a directed link from actor to recipient	Bilateral conflict events; each event record creates a directed link from actor to recipient
Directionality	Directed	Directed

Edge Definition	Actor → Recipient (initiator of hostile action → target of hostile action)	Actor → Recipient (initiator of cooperative action → target of hostile action)
Edge Weighting	Cumulative count of conflict events aggregated per ordered actor pair	Cumulative count of cooperation events aggregated per ordered actor pair
Node Size Logic	Sum of all outgoing conflict events initiated by that actor	Sum of all outgoing cooperation events initiated by that actor
Layout Method	ForceAtlas2-based force-directed layout (shared across layers)	ForceAtlas2-based force-directed layout (shared across layers)
Community Detection	Greedy modularity algorithm (optional)	Greedy modularity algorithm (optional)

5. Analysis and Visualisation

This section explains how the outputs of GINA Information can be interpreted and how the different visualisation supports analytical use. The dashboard translates the methodological choices described in earlier sections into interactive network views, maps and quantitative indicators. Section 5.1 demonstrates the types of insights that can be derived from the network views, at both the global level and for individual states, highlighting patterns of information exchange, alignment, and contestation. Section 5.2 presents the complementary tools available on each page, including spatial representations, summary metrics, and temporal trends, and explains how these elements collectively enable a more comprehensive understanding of evolving conflict and cooperation dynamics. Taken together, these components position GINA Information as an exploratory and comparative environment for analysing information-based interactions between actors over time.

5.1. Network Analysis

This section presents examples of how the GINA Information dashboards can be used to generate analytical insights into patterns of conflictual and cooperative information interactions. Although the two layers capture distinct types of relationships, their shared visual and structural logic enables them to be examined in parallel and compared systematically. At the global level, the networks reveal broad configurations of clustering, centrality, and structural fragmentation. At the state level, they illustrate how individual actors are positioned within the information environment, highlighting their relative connectivity, influence, and engagement across both conflictual and cooperative ties. Taken together, these examples demonstrate how the network-based approach can uncover meaningful patterns in the international information landscape and support more rigorous analysis of evolving dynamics of alignment, contestation, and exchange.

5.1.1. Global dynamics

The global cooperation and conflict networks for 2025 display a highly interconnected structure, accompanied by a clearly identifiable periphery composed primarily of smaller states.

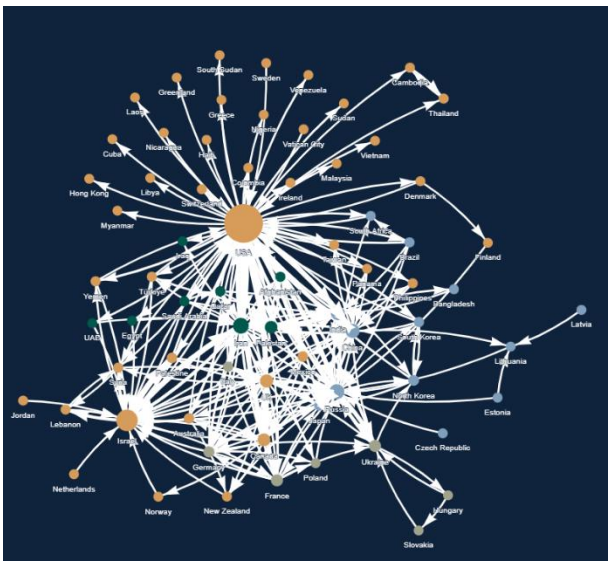

Figure 1 - Global Conflict network (2025)

Within the cooperation network, the United States, China, Russia, and Ukraine emerge as the most prominent nodes in terms of connectivity and centrality. For the United States, China, and Russia, this prominence reflects the structural position of major powers, which frequently employ cooperative engagement, such as diplomatic, economic, and security initiatives, as instruments to consolidate influence and shape their respective spheres of interaction. Their extensive resources enable sustained investments in international partnerships, giving them a comparative advantage in establishing and maintaining cooperative ties relative to smaller states. Because cooperation often entails material and institutional costs, financially and politically capable actors are better positioned to occupy central roles within the network.

Peripheral countries are largely located in Africa, Asia, and South America. These actors tend to have fewer outgoing cooperative initiatives but are often recipients of cooperation from larger powers. As

such, their network positions can offer indicative insights into patterns of alignment or dependency, revealing which major actors they engage with most frequently.

Ukraine's centrality, by contrast, is largely context-specific. Its prominence in the cooperation network reflects the ongoing war and the substantial inflows of military, economic, and humanitarian assistance it receives, particularly from European states and the United States. This illustrates how acute geopolitical crises can temporarily reshape network structures by concentrating cooperative activity around strategically significant actors.

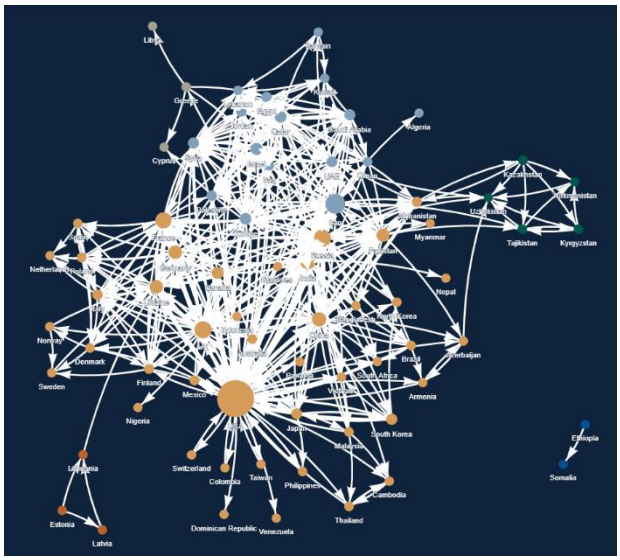

Figure 2 - Global Cooperation network (2025)

The conflict network exhibits a different configuration. The United States, Israel, and Russia emerge as the most prominent nodes. Their centrality is largely explained by their direct involvement in ongoing wars and their comparatively assertive use of coercive and conflictual strategies to shape the international environment in line with strategic objectives. Sustained military engagements, proxy involvement, and broader geopolitical rivalries generate numerous conflict ties, positioning these states as hubs within the global conflict landscape.

Beyond these major powers, a second tier of actors appears as smaller yet still well-connected nodes. Countries with authoritarian or semi-authoritarian regimes, such as China and Venezuela, occupy more modest positions in terms of overall visibility but maintain a notable number of conflict connections. This pattern suggests persistent tensions, strategic competition, or indirect confrontations that link them to broader geopolitical disputes without placing them at the network's centre.

A similar intermediary pattern is observable among several Middle Eastern states. Although individually smaller nodes, they are situated between the major powers, reflecting the region's recurrent instability and its role as a site of overlapping conflicts. Great powers have frequently engaged in conflictual actions, directly or indirectly, within the Middle East, which structurally connects local disputes to wider international rivalries. In contrast, some actors form relatively isolated sub-networks. Bosnia, Serbia, Kosovo, and Croatia display ties largely confined to their immediate region. While marked by a history of regional conflict, these states show limited direct engagement with contemporary great-power confrontations, resulting in peripheral positions within the global structure.

5.1.2. **State Comparisons**

The state-level comparison allows users to zoom in on individual countries or examine how selected actors relate to one another across both the cooperation and conflict layers. For instance, by isolating major powers such as the United States and China one can observe where their cooperation network diverges but also compete, with countries who cooperate with both great powers and other that show a more bilateral alignment. Inversely, the state comparison tool in the dashboard allows to observe which countries have conflict in common with other

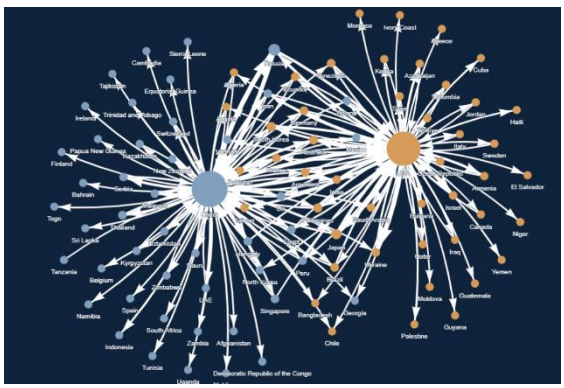

Figure 3 - Cooperation network for USA and China (2025)

actor towards a third party as well as compare the involvement into conflict of two countries in the same region in a quantitative way.

5.2. Additional visualisations

Beyond the network layers, GINA Information provides several complementary visualisations that allow users to explore spatial patterns, quantitative summaries and temporal trends. These tools offer alternative entry points into the data and help contextualise the relational structures shown in the network views.

5.2.1. Map-based patterns

Both the cooperation and conflict layers include a global map visualisation that summarises country-level geopolitical events. The choropleth map shows the geographic distribution of conflict and cooperation events. Countries are colored based on the total number of events they were involved in (either as actor or recipient). Filters exist to allow a focus on specific contexts or conflict/cooperation types.

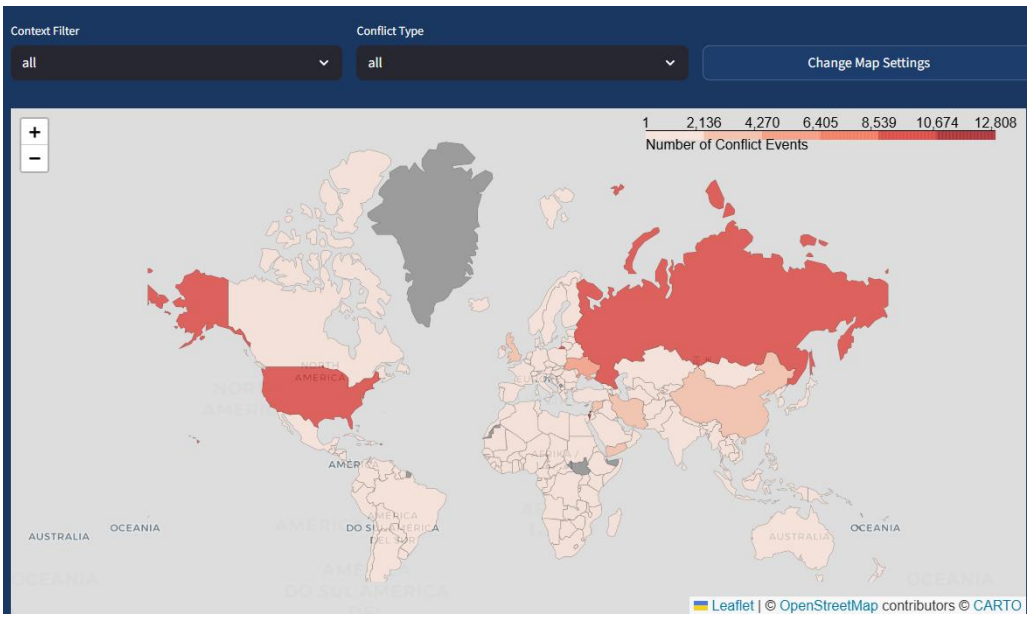

Figure 4 - Map of conflict events (2025)

The map also functions as an entry point into the state-level view: selecting a country on the map directly loads its corresponding network and metrics. This provides an intuitive bridge between spatial patterns of geopolitical cooperation/conflict and relational structures of geopolitical events.

5.2.2. Quantitative Overview

Both layers present a set of summary statistics that provide a quick overview of the magnitude and direction of activity in the selected period. These include total conflict/cooperation events, most common event type, and most involved country. Both include a delta from the previous year. These indicators offer a compact snapshot of the broader trends that underpin the network structures and help users situate individual actors or regions within global patterns.

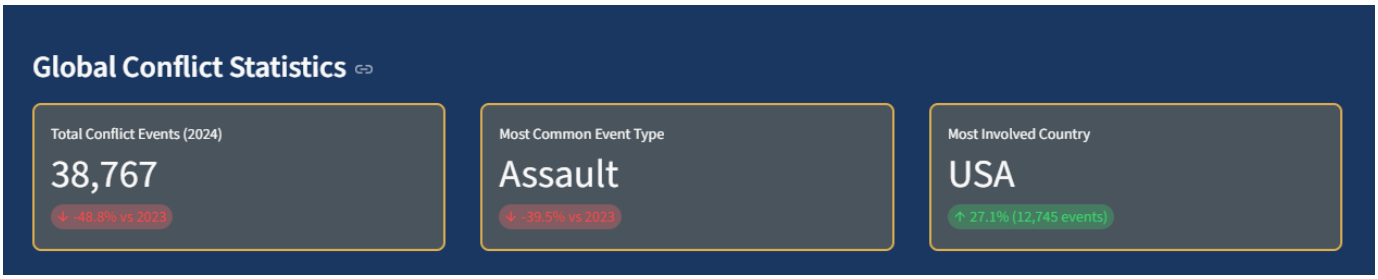

Figure 5 – Global Conflict Statistics (2024)

5.2.3. **Temporal Dynamics**

A dedicated time-series view in both layers illustrates how conflict and cooperation events evolves over time. For both cooperation and conflict, users can track how different event types (e.g. aid, concede, cooperate), identifying patterns of geopolitical trends or shifts in approaches to cooperation or conflict. From this visualisation, it is also possible to see the differences in classification between POLECAT and EDGAR.

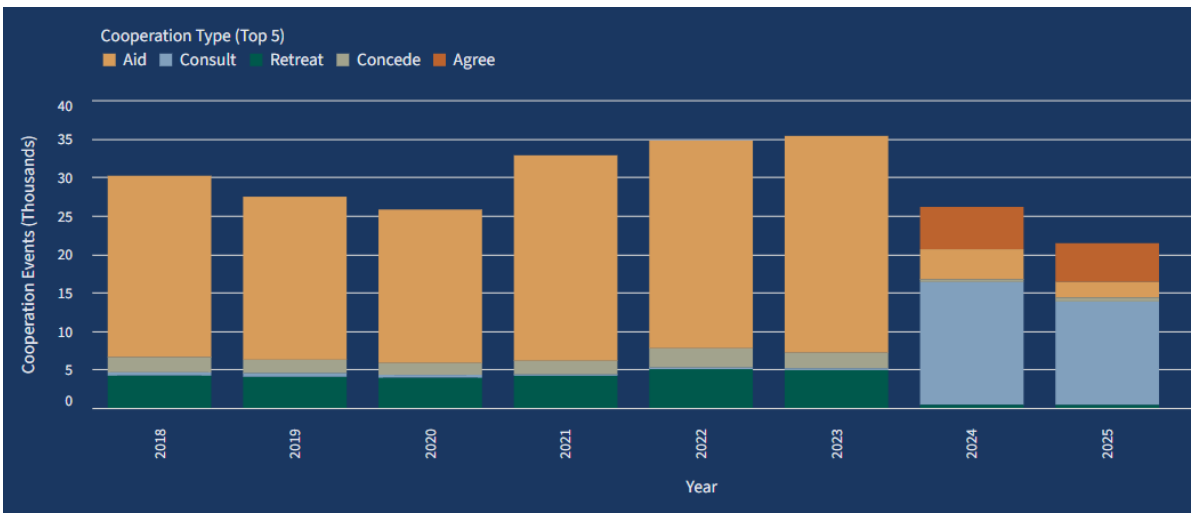

Figure 6 - Global-level time series tool for Cooperation page (2026)

Users may choose different chart types (area, line or bar) and between mode and type, allowing them to switch between cumulative and discrete visual styles depending on the analytical question.

6. Limitations

This section outlines the main constraints that affect how the outputs of GINA Information should be interpreted. These limitations arise both from the properties of the underlying event datasets and from methodological choices made in translating event data into network representations. While these constraints shape the precision and scope of the analysis, they do not undermine the value of the dashboard as a systematic and transparent analytical baseline for exploring patterns of cross-border information-based cooperation and conflict.

6.1. Data Limitations

GINA Information relies on automated extraction and classification of geopolitical events from international news sources, primarily through the POLECAT and EDGAR datasets. As with all media-based event data, observed interaction patterns are influenced by reporting and attention biases. Events involving major powers, ongoing conflicts, or regions with dense international media coverage are more likely to be reported and therefore coded, while interactions involving smaller states, less visible actors, or regions with limited press access may be underrepresented. As a result, network centrality and activity levels partly reflect media salience in addition to real-world interaction intensity.

Despite improvements in model-based extraction, classification uncertainty and noise remain inherent to automated event coding. Ambiguities in language, indirect references, and complex multi-actor events can lead to misclassification of event type or the cooperative/conflictual nature of an interaction. Although EDGAR reduces duplication and improves contextual interpretation relative to earlier transformer-based approaches, some degree of event duplication, oversimplification, or misattribution persists, particularly in fast-moving or highly politicised news environments.

Actor identification and standardisation also introduce limitations. While harmonised country and actor mappings ensure consistency across datasets and time, actor resolution challenges remain for non-state actors, coalitions, and loosely defined entities. The inclusion of third parties in EDGAR improves contextual coverage but does not fully resolve ambiguities around relevance, influence, or degree of involvement. Consequently, the presence of an actor in the network indicates informational relevance rather than direct participation in every aspect of the event.

Finally, the datasets capture observable information interactions, not intentions, outcomes, or offline coordination. Silence, covert communication, and informal signalling are structurally absent, meaning that the networks reflect what is publicly reported rather than the full universe of geopolitical information exchange.

6.2. Methodological Limitations

The translation of event-level data into network structures necessarily involves aggregation and simplification. In GINA Information, multiple events between the same actor pair within a selected time window are aggregated into a single directed edge weighted by event count. This approach highlights sustained interaction patterns but obscures variation in intensity, sequencing, and contextual nuance within individual relationships. High edge weights may reflect repeated low-level interactions rather than escalation, while single high-impact events are treated equivalently to routine actions of the same category.

Importantly, conflict intensity or severity scores are not currently incorporated into the network construction process. Edges reflect only the number of coded conflict events, not their relative weight or escalation level. As a result, a large number of lower-intensity interactions (e.g., accusations, diplomatic disputes, or rhetorical confrontations) may produce network structures similar to those

generated by fewer but more severe events (e.g., assaults or other high-impact hostile actions). Differences in conflict gravity are therefore not encoded in edge weights, and interpretations of interaction strength should be understood as frequency-based rather than severity-based.

Temporal aggregation further constrains interpretation. When multi-year periods are selected, edge weights represent cumulative activity across the entire interval, blending short-term shocks with longer-term structural relationships. This supports comparative analysis but limits fine-grained assessment of escalation dynamics or rapid shifts in behaviour. Although time-series views mitigate this to some extent, the network layers themselves remain snapshots of aggregated interaction histories.

The current emphasis of GINA Information is on visual and exploratory analysis rather than formal network modelling. Advanced metrics such as weighted centrality measures, role equivalence, brokerage, or temporal network statistics are not computed in the present version. As a result, network positions should be interpreted qualitatively and comparatively, not as precise quantitative indicators of power or influence.

Visual layout algorithms introduce additional constraints. Force-directed layouts produce intuitive representations of relational structure but include small stochastic elements that can lead to minor differences in node placement between runs. Spatial proximity in the visualisation should therefore be read as indicative of relational patterns rather than as an exact metric distance.

Despite these limitations, GINA Information provides a coherent and reproducible framework for examining how cooperation and conflict manifest in the international information environment. By making its data sources, classification logic, and aggregation choices explicit, the dashboard enables informed interpretation and supports comparative analysis across actors, regions, and time. Future development will focus on methodological refinement, expanded analytical metrics, and deeper integration of contextual information to further enhance interpretive precision.

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