

## Graph Editing

The KAIROS program seeks to develop a schema-based AI system that can identify complex events and bring them to the attention of users. KAIROS aims to understand complex events described in multimedia inputs by developing a semi-automated system that identifies, links, and temporally sequences their subsidiary elements, and the participants involved. [5].

## Knowledge-directed Artificial Intelligence Reasoning Over Schemas (KAiROS)

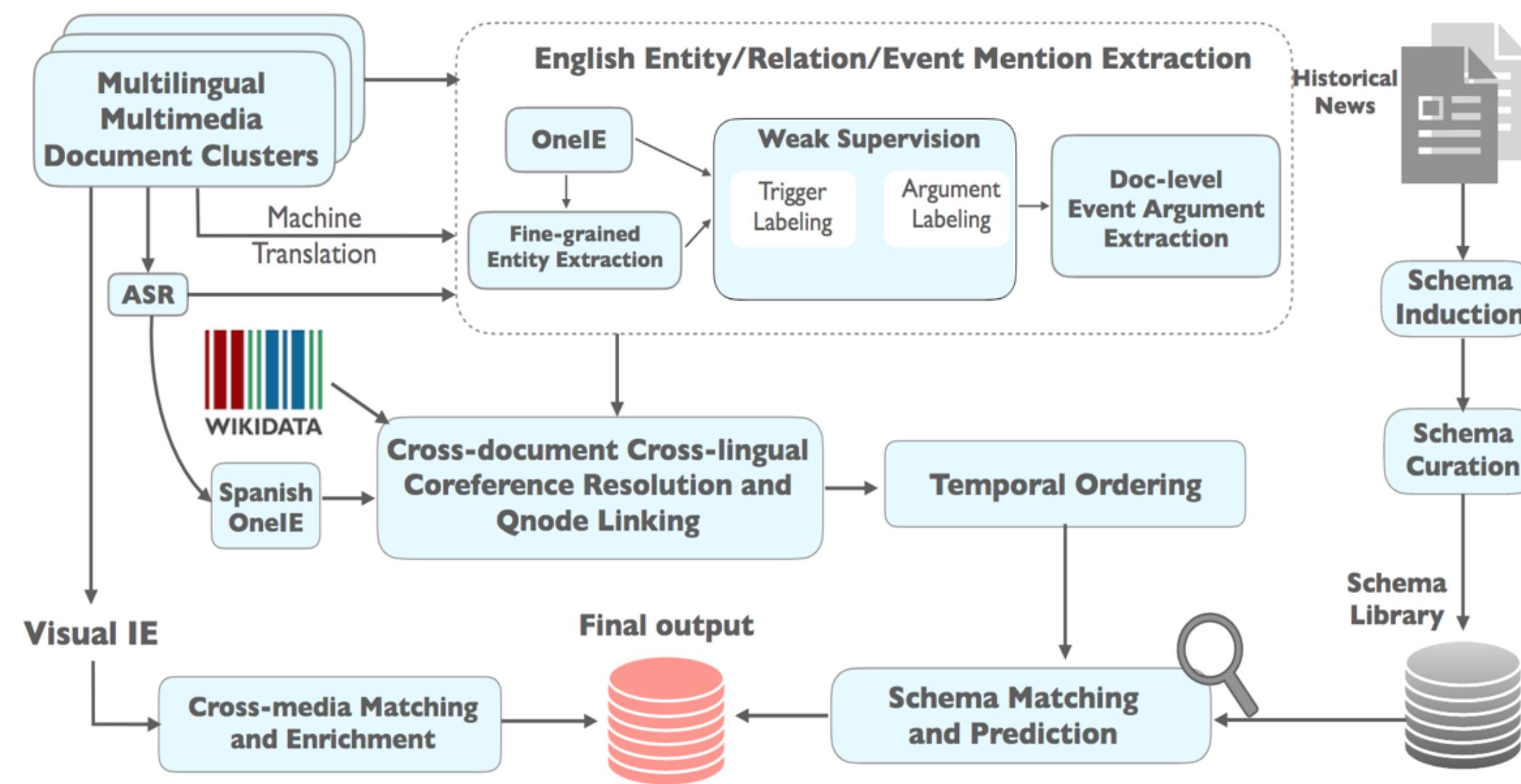


Figure 1. The goal of schema curation is to produce schemas that are detailed and complete enough for accurate prediction. The schema curation process is part of a much larger event prediction system, utilizing multimedia and multilingual document clusters for a final output schema library

In the field of natural language processing, much research has been done in the area of extending simple events into more complex event-entity relations. This has resulted in work such as ISO-TimeML [15] and Richer Event Descriptions [14]. Both papers investigate how annotation can help to describe complex relations, and they contribute to a schema data format able to be read by a computer.

Graph visualization tools for treebanks, PropBanks [1], and ontologies [8] are already found in practice. To our knowledge, no other open-source interface for complex event schema visualization and editing has been developed aside from the predecessor of this interface.

Automatically induced event schemas have recently been made possible through large language modeling [11] and graph modeling [12]. This innovation has created a need for human schema revision and curation tools. Automatically induced schemas are often noisy, have limited coverage, and are unsuitable for downstream tasks [6].

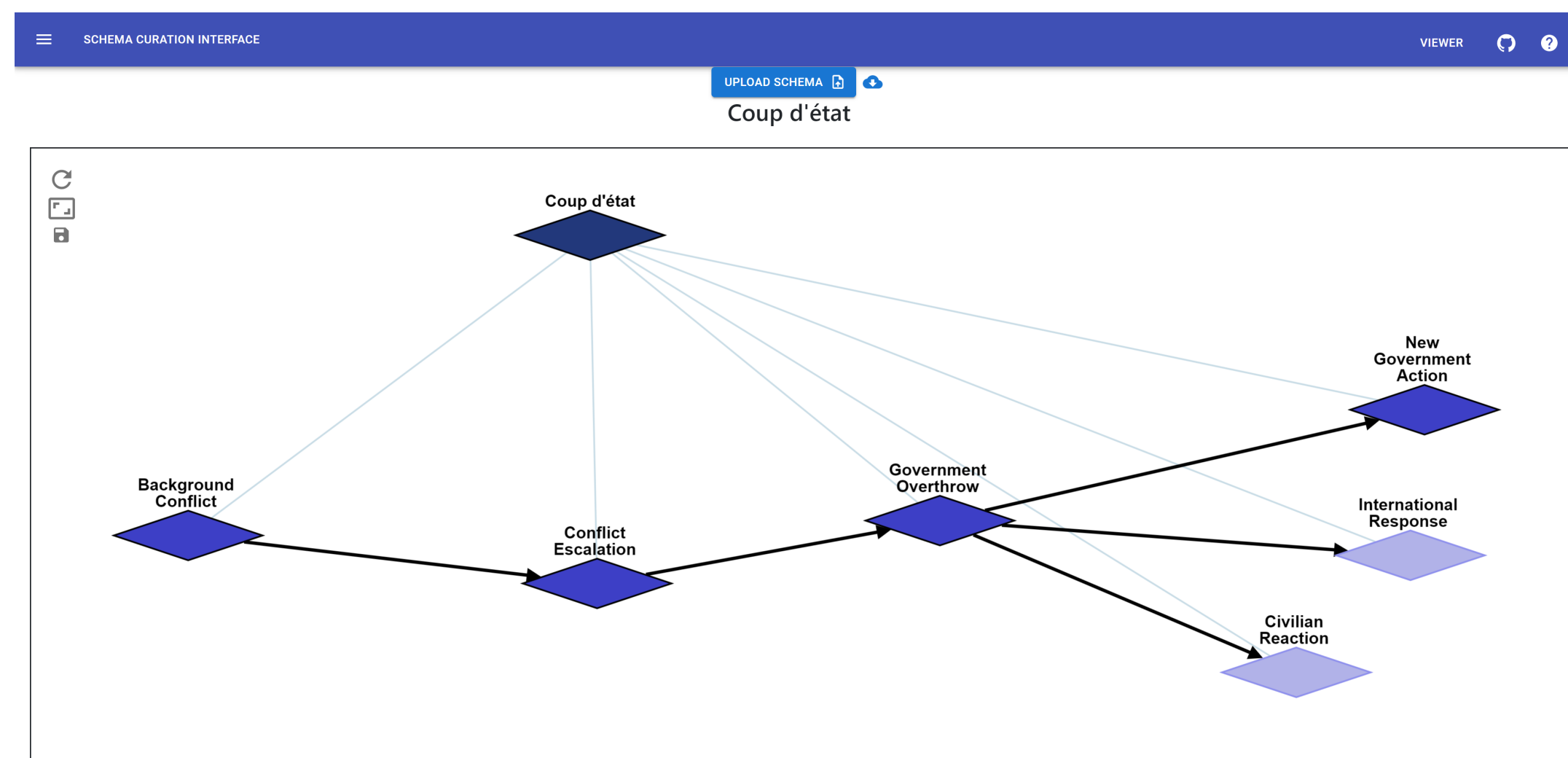


Figure 3. A coup d'état event loaded into the schema curation interface. The three buttons on the top left corner of the canvas: Resize the aspect ratio, refresh the graph, and download a snapshot of the schema. Each one functions as a necessary part of the curation workflow.

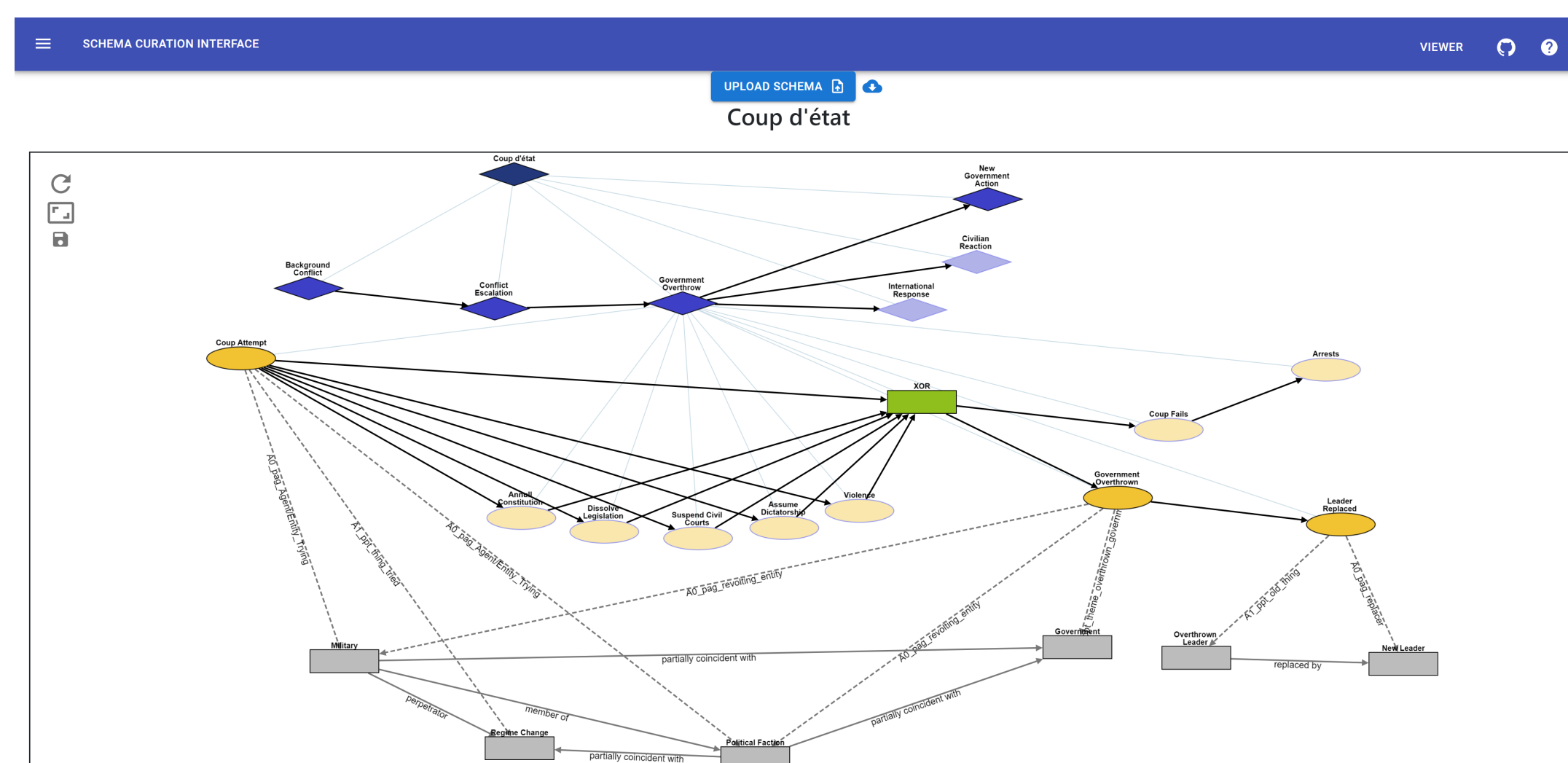


Figure 4. A fully expanded schema can contain many levels of event hierarchy. There is always, however, a root node at the top level which contains chapter events (represented as blue diamonds in figure 4). Within the chapter events there can exist other chapter events, or primitive events which are populated with entities.

## Grounding Ontology

Each event, entity, and relation has its own unique ontological information stored within it. The ontology which grounds events and entities is possible through The DARPA Wikidata Overlay: Wikidata as an ontology for natural language processing, publication in preparation.

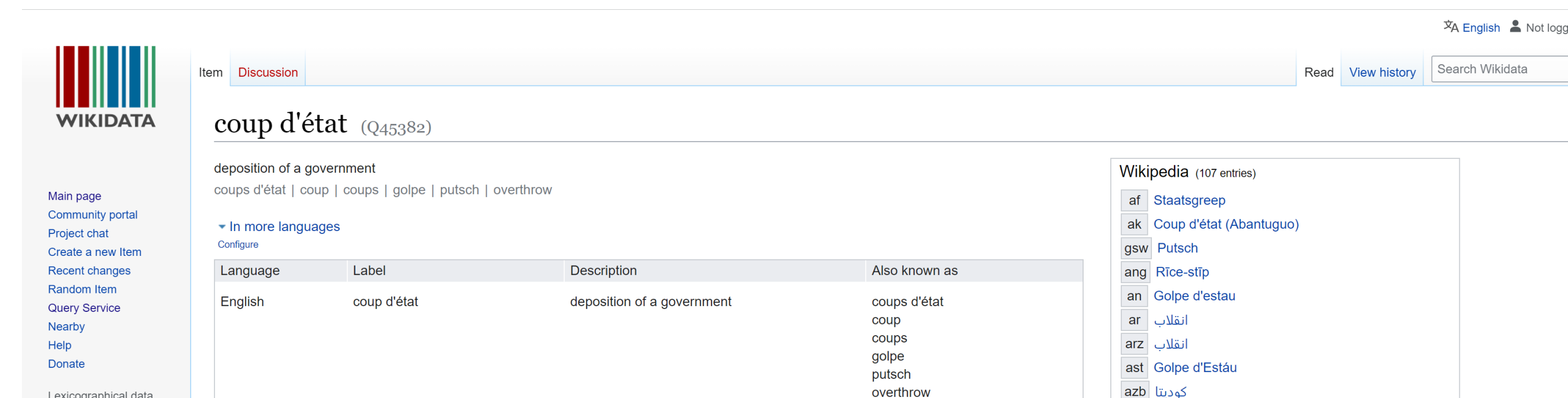


Figure 5. Wikidata entry for the coup d'état event. Q-node Q45582 links our schema to a larger grounding ontology.

In SCI 2.0, users were required to modify the JSON source file directly to curate or edit the schema. SCI 3.0 introduced the interactive editing feature seen in Figure 7 that enables users to make changes to the schema by directly clicking on nodes and edges in the visualization. This eliminates the need for users to have prior knowledge of JSON syntax and allows them to easily modify the schema in real time through the browser.

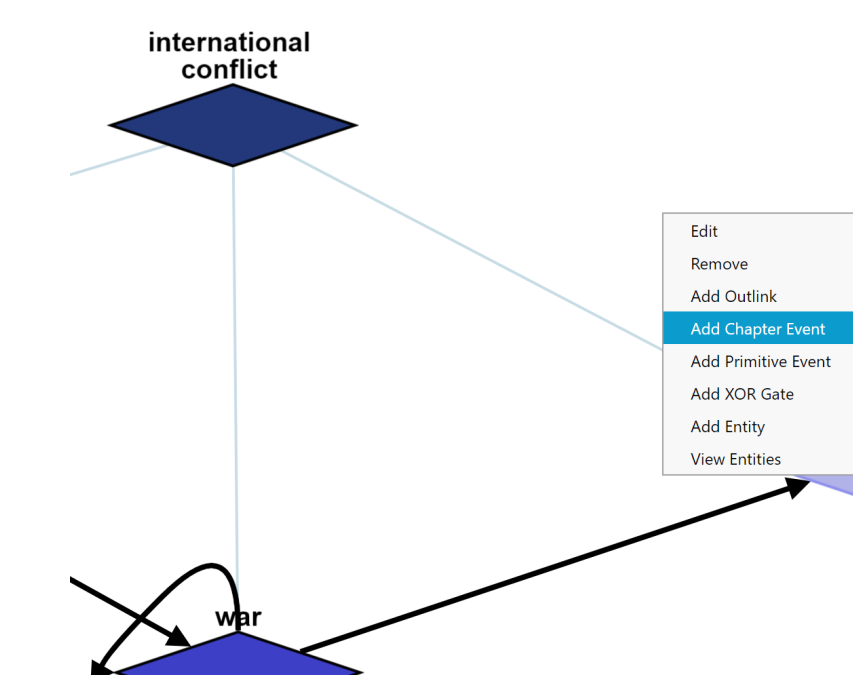


Figure 7. JSON editing component used in SCI 3.0.

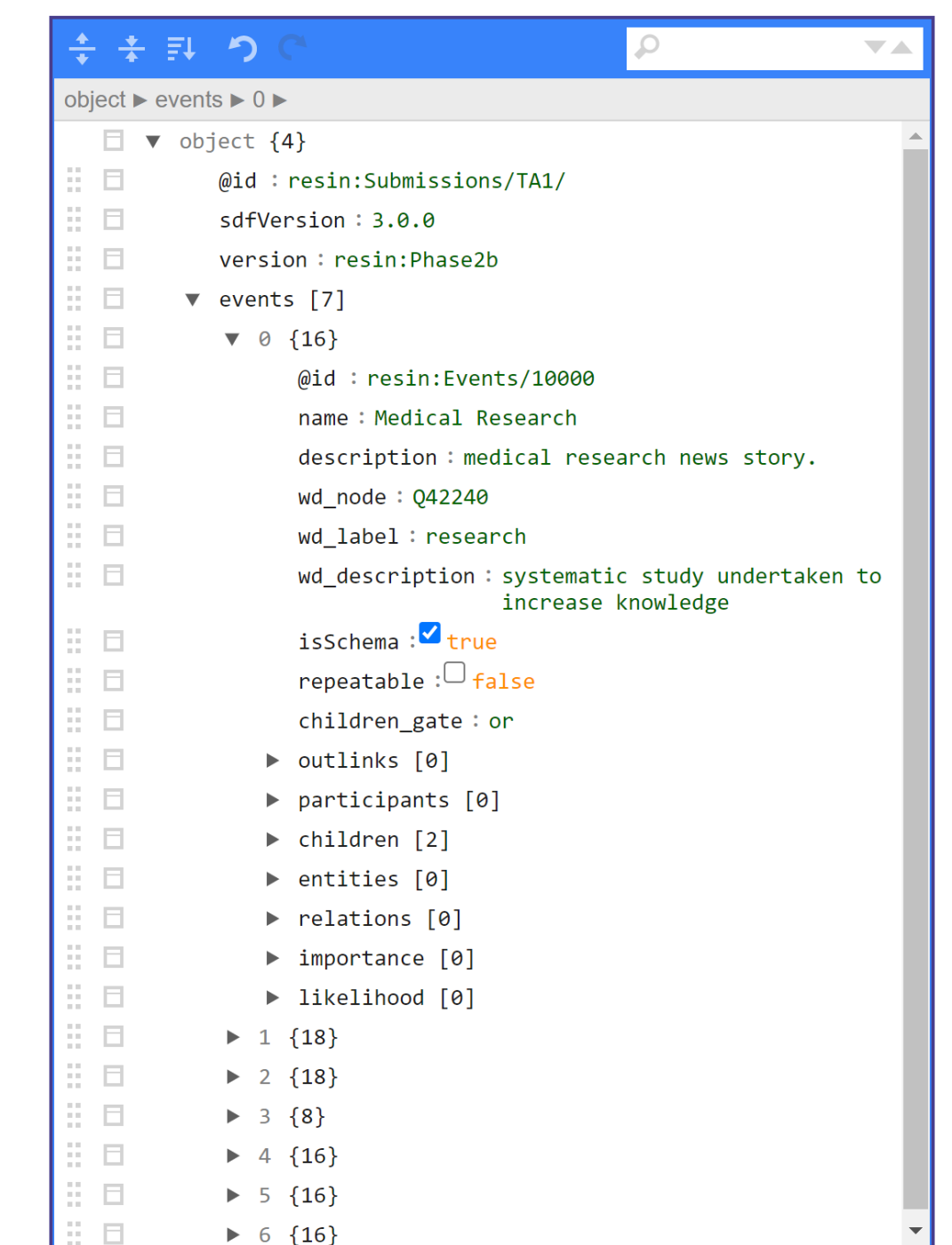


Figure 6. JSON editing component used in SCI 2.0

New Government Action

Edit the properties of parent.

idresin:Events/00042/

nameNew Government Action

descriptionFirst actions of new leader

urlcodewd:Q4026292

urllabelaction

url\_descriptionsomething an agent can do or perform

isSfermatrue

responsivefalse

isPrivatefalse

childrenresin:Events/00043;/resin:Events/00044;/resin:Events/00045;/resin:Events/00046;/resin:Events/00047;/resin:Events/00048;/resin:Events/00049;/resin:Events/00050;/resin:Events/00051;/resin:Events/00052;/resin:Events/00053/

modality

CANCEL

SUBMIT

Figure 8. After a user clicks the 'edit' option in the context menu, a text field dialog box appears where they can directly edit node or edge data.

Current efforts on the SCL are directed toward making the tool more user-friendly. During the extensive curation process of over 40 unique newsworthy events, it became clear that many of the sub-schema events could be reused in the future, even in different domains.

## Links & Citations

Left-to-right: Citations, GitHub, Schema Curation Interface




(a) Citations



(b) GitHub



(c) Schema Curation Interface



**FDA - Adverse Event Reporting System (FAERS)**

FOIA Case Report Information

Case ID: 17610621

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**Event/Problem Narrative:**

CBSGMEB Health Authority report from a physician via the Regulatory Agency (NL-LRB-00383645) concerns A 73 years old female patient (weight 83 kg, and height 167 cm), who experienced QTc- extension and dynamic interaction of chloroquine / lithium carbonate and quetiapine while receiving quetiapine fumarate (300 mg) (Tablet MVA, 300 mg, 1 x per day 1 piece) from 2013 for bipolar ii disorder and bipolar type ii disorder (Route of administration unspecified), chloroquine (600 mg) (Tablet, 100 mg, 2 x per dag 3 stuks, 1e dosis 6 stuks) from 05-Mar-2020 to 09-Mar-2020 for corona virus infection and corona virus infection (Route of administration unspecified) and lithium carbonate (300 mg) (300 mg, 1 x per dag 1 piece) from 09-Mar-2020 for bipolar ii disorder and maintenance dose of bipolar disorder type ii (Route of administration unspecified).

The patient's past drug history included as lithium carbonat and which caused no adverse event and quetiapine and which caused no adverse event Concomitant medication included dalteparin (1 dosage) (Injection Fluid, 25,000 IU / ml (units per milliliter)) (Route of administration and indication unspecified), paracetamol (1 dosage) (Infusion fluid, 10 mg / ml (milligrams per milliliter)) (Route of administration and indication unspecified), oxazepam (5 mg) (Tablet, 5 mg (milligram)) (Route of administration and indication unspecified) and cefuroxim (1 dosage) (Injection fluid) (Route of administration and indication unspecified).

Figure 2. This medical document has sections highlighted to demonstrate information that might be captured during the automatic induction process.