# A Deliberation Knowledge Graph: Bridging Institutional and Civic Democratic Discourse

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**Abstract.** Democratic deliberation is taking place nowadays in the digital sphere: discussions in the social media, in the new eDemocracy platforms and in the official parliamentary sessions that create digital data. These deliberation data hold immense potential for analysis and insight, and the interest grows when diverse sources are interconnected. This paper introduces the Deliberation Knowledge Graph, a technological solution to integrate deliberation processes, arguments and participants across different institutional and civic spheres. First, the Deliberation Ontology is presented, a joint data model. Then, the systematic integration of deliberation data from European Parliament proceedings, civic participation platforms, and public forums is described. As an example of application that can have this new technology, the paper describes how this knowledge graph particularly enhances the capacity to examine argument quality, identify reasoning patterns, and trace the evolution of policy positions across different deliberative spaces. Potential applications and problems are discussed.

**Keywords:** knowledge graph, deliberation, semantic web, ontology, parliamentary debates, civic participation

## 1 Introduction

Public deliberation refers to the process through which citizens, elected representatives, and other stakeholders engage in reasoned discussion to shape collective decisions. As highlighted by the OECD [1], public deliberation is a core component of democratic innovation, enabling informed, inclusive, and reflective input into policymaking. Public deliberation occurs in institutional settings such as parliaments, in civic participation platforms, and increasingly through informal channels like social media, where public arguments and opinions contribute to forging the democratic discourse.

In recent years, civic participation platforms such as Decidim[1], Consul[2], and other digital democracy tools have proliferated, offering digital spaces for engagement. At the same time, institutional deliberative forums, such as parliaments, have also begun leaving digital traces of their discussions. Together, these diverse

[1] `https://decidim.org`
[2] `https://consuldemocracy.org/`

deliberative spaces generate rich datasets that capture arguments, positions, and decision-making processes. This data can be used to analyze public discourse, track policy evolution, identify key arguments, and assess the impact of deliberation on decision-making. It also enables the development of AI-driven tools for summarization, sentiment analysis, and trend detection, enhancing transparency and civic engagement.

The immense potential of these datasets could be even greater if they were analyzed together. However, their heterogeneous formats pose a technical challenge. This paper presents the proof-of-concept of a technical solution to unlock the full potential of integrated deliberative data: the Deliberation Knowledge Graph (DKG)[3].

A Knowledge Graph is a structured representation of real-world facts, entities, and their relationships, typically organised as a network of nodes and edges. Knowledge Graphs have been published in the last few years in many contexts –from the general Google Knowledge Graph to domain-specific ones. Entities in a knowledge graph on deliberations include indeed 'arguments', 'participants' or 'topics'. Relations include the membership to a 'political party', or the connection between an 'argument' and some 'evidences'.

Knowledge graphs are connected to external datasets, meaning that the exploration of the information can extend beyond the limits of the graph itself. For example, deliberations can be connected to the legislation (which is also digitally published), members of the parliaments can be connected to their activity elsewhere, data can be connected to Wikidata facts. The possibilities are unlimited –the more the connections, the more broader the applications– and this is the principle behind the idea of Semantic Web linked data [2]. The integration of data from heterogeneous sources requires, however a core model. Knowledge graphs are anchored to core models, usually defined by means of *computer ontologies*. This paper presents a Deliberation Knowledge Graph and the underlying Deliberation Ontology.

The remainder of this paper is organized as follows: Section 2 presents the background, including motivation and a very clear statement on the work limitations. Section 3 presents the Deliberation Ontology, including its conceptual model and key components. Section 4 describes the data integration process for connecting diverse deliberation datasets and the technical implementation details of the Deliberation Knowledge Graph. Section 6 reviews related work before Section 7 concludes the paper discussing future work.

## 2 Background

### 2.1 Motivation

Computers have analyzed many aspects of human life, improving processes, detecting errors, and driving innovation. If it's data, it can be analysed. However, the analysis of deliberation data remains underexploited (at least publicly). Two

[3] `https://stocastico96.github.io/Deliberation-Knowledge-Graph/`

conditions make our effort timely: on the one hand, only now is deliberation data from institutional sources being made widely available online; on the other hand, natural language processing technologies have only recently reached a level of performance that makes large-scale analysis feasible.

Having data that is connected, readily accessible from a single point, and structured according to a common model is a precondition for meaningful exploitation. The Deliberation Knowledge Graph addresses these needs by integrating data from institutional deliberation (such as parliamentary proceedings), citizen deliberation (on civic participation platforms), and potentially even informal argumentation on social media. By doing so, our effort enables:

- *Integration of institutional and civic democratic discourses*, e.g., deliberation taking place at the European Parliament sessions[4] can be connected with the public discussion in internet forums, social networks, and other eParticipation platforms such as 'Have Your Say' [5] or Decidim.
- *Analysis of deliberative processes across different contexts.* A Deliberation Knowledge Graph would be valuable for a wide range of applications, including journalism, historical research, political science, and comparative studies.
- *Standardised representation of argument structures for fallacy detection.* Deliberation that leads to the adoption of key norms—often with far-reaching societal impacts—should be subject to rigorous scrutiny. We launch rockets with millimetric precision, yet the arguments behind norms that affect billions may pass without any structured validation.
- *Cross-dataset queries.* The graph can uncover inconsistencies in party positions, track the evolution of individual viewpoints, or identify mutual influences between different institutions and actors.
- *Semantic enrichment of deliberation data.* Named entity recognition algorithms can annotate deliberative content and link it to external knowledge bases (such as Wikidata[6]), enhancing its interpretability and discoverability.
- *Build epistemic democracy.* The graph empowers citizens with knowledge by integrating diverse deliberative sources –a form of epistemic democracy [**?**]. The very distributed and open nature of the Semantic Web –and knowledge graphs are their ultimate expression– makes possible for every citizen to build on this stone. Epistemic democracy based on these networked structures are well explored in the book Linked Democracy [3].
- *Build a pluralistic digital infrastructure* The DKG aligns with the vision of digital plurality articulated by Tang, Weyl, and the Plurality community [4], creating connections between formal institutions and civic spheres. By bridging these traditionally separate deliberative spaces, the DKG enables accountability across contexts and supports what Tang describes as *rough consensus* in digital deliberation.

[4] `https://data.europarl.europa.eu/`
[5] `https://ec.europa.eu/info/law/better-regulation/have-your-say_en`
[6] `https://www.wikidata.org/`

### 2.2 Limitations

Designing an ontology requires a considerable effort, populating a Knowledge Graph with significant amounts of data even more. The exploratory ambitions of this work are however limited: the ontology model is minimal and the amount of data in the graph modest –this is enough for developing a proof-of-concept knowledge graph that evidences the possibilities and limitations of the approach. But beyond the limitations derived from the limited size of the graph, there is a number of fundamental problems that can be advanced from the very beginning.

**Lack of pragmatics.** The Deliberation Knowledge Graph is an embodiment of the Semantic Web's ideals –structured data, formal semantics, and machine-readable meaning [5]. In linguistics, *syntax* concerns the structural relationships between linguistic forms—the rules that govern well-formed sequences; *semantics* addresses the relationships between those forms and the entities they refer to in the world; *pragmatics* studies how linguistic forms relate to their users — their intentions, assumptions, and the context of communication. The Semantic Web is, at best, Semantic. It overlooks the user, the context, the deliberation participant intentions, the play of ambiguity and irony, the social dynamics of communication –in short, everything that gives language its human meaning. While detecting fallacies and inaccuracies is useful, it is less significant compared to the broader context often omitted: the pragmatic dimension matters far more. Arguments do not exist in a vacuum; they are offered, contested, ignored, or strategically reframed by participants with intentions, beliefs, and stakes. What is not said –what is implied, presupposed, or withheld—often carries more weight than what is explicitly stated. The DKG captures the surface of deliberation –the who-said-what– and how it connects, but the deeper currents of meaning flow beneath, in what remains unsaid, in context, in silence.

Representing the deliberation participants' needs and contexts to facilitate the automated interactive and collective management of knowledge –the *pragmatic turn*, as it has been called [6], would mitigate the problems, but making progress is costful and not much effective. Building a *Pragmatic Web* as 'a set of pragmatic contexts of semantic resources' [7] is quixotic, and the partial efforts not really useful: Bonacin proposed a communication act ontology that links acts, agents and behaviour patterns [8], but the number of those is unlimited. In their book, Sperber and Wilson claim that relevance is seen as the key to human communication and cognition [9], but attempts to model relevance show the difficulties, even in well-defined contexts [10].

**Privacy and contextual integrity.** While the DKG enhances transparency by making visible the connections between arguments across platforms, it also raises privacy concerns related to participant identification and *contextual integrity* [11]. The knowledge graph may be repurposed in ways that ignore the context-sensitivity of deliberation –reframing participants' contributions out of context, instrumentalising argument structures for unintended goals (e.g., surveillance), or creating an illusion of objectivity and neutrality where in fact norms and intentions were essential. In this light, the very strength of the DKG –its formalism and reusability– become a liability when contextual integrity is not respected.

**Hypersuasion.** Additionally, as Floridi argues, increased connectivity could potentially enable more sophisticated forms of persuasive influence or *hypersuasion* [12]. Hypersuasion uses the capacity of artificial intelligence to influence individuals' beliefs and behaviors through personalized, data-driven strategies. The entire deliberative process becomes compromised if human autonomy is undermined by manipulative machines. In other words, if deliberation becomes data, deliberation can be controlled. Is digitizing deliberation a good idea at all?

AI-optimised software realizes Wiener's vision in his book *The Human use of Human Beings* [13] –the title says it all. Cybernetics and feedback loops make it possible to optimise environments, and in this case, the consensus within a particular forum. In this subtle form of warfare, power is unevenly distributed: those with greater computational resources –or more crucially, with more personal data– will possess stronger AIs capable of imposing their manufactured consent.

Having acknowledged its limitations –and, more troublingly, its potential for misuse– it is now time to turn to the modest yet constructive contributions of this work.

## 3 Deliberation Ontology

### 3.1 Rationale

One of the most quoted definitions of computer ontology is the one by Studer: "a formal, explicit specification of a shared conceptualization" [14]. If different data sources are to be integrated, having an explicit conceptualization to pivot on is key. The ontology serves as the formalised data model that structures and represents knowledge in a manner intelligible to both machines and humans.

Ontologies were born to formalise domain-expert consensus on a certain matter, but with the years, they have proved to be excellent data models in computer applications as well –in particular, ontologies serve as the best defined data models for knowledge graphs.

Parliaments, civic participation platforms and social networks host, in a way, different sorts of democratic deliberation. If they are to publish data, they will speak about 'members the parliament', 'citizens' or 'users' respectively to those participating in the debates. These debates will be called, perhaps, 'sessions', 'issues' and 'threads'. Yet, they refer essentially to the same ideas, at least in relation to the deliberation that is taking place. A computer ontology can define core concepts, and entities from each of the data sources can be linked to it. Ontologies provide a standardized vocabulary and a hierarchical framework, specifying, for instance, that "MPs" (members of parliament) belong to "political parties," which in turn are types of "organizations". This structured representation enhances the interoperability of data across systems, supports advanced querying, and facilitates semantic reasoning.

Ontologies have been defined for all the conceivable domains. Here and there ontologies have flourished, big and small, complex and simple, with a computing purpose or even without it. Because the mere formalization of a consensus is of great interest.

In the design of computer ontologies, a joint effort is made by ontologists and domain experts. Creating ontologies in some technical domains is relatively straightforward. For instance, in the domain of transportation, experts may define concepts like 'vehicle', 'road', 'traffic light', and 'driver', along with their relationships—such as 'a vehicle travels on a road' or 'a driver operates a vehicle'. These relationships are clear, and consensus is often easy to reach. However, the domain of democratic deliberation is much more sensitive. It involves complex, subjective concepts like 'argument', 'consensus', 'disagreement', and 'public opinion', which may have different interpretations depending on cultural, political, or legal contexts. Reaching a consensus on these terms is a challenging task, as it requires aligning diverse perspectives on how deliberative processes should be represented and understood. Therefore, in order to build the ontology to serve as the basis for the DKG, a minimal commitment has been ambitioned. Moreover, its design has been led by the technical operations intended to be made on the data.

### 3.2 Requirements

The creation of an ontology is a process that can be engineered, i.e. there are standard methodologies to be followed and quality assurance mechanisms that grant some minimum quality levels. In particular, the Deliberation Ontology was developed following the LOT methodology [15], guided by an Ontology Requirements Specification Document (ORSD) that defines its purpose, scope, and requirements. The ORSD for the Deliberation Ontology specifies both functional and non-functional requirements and is also online[7]. The functional requirements are expressed as competency questions (i.e., "What contributions were made in a specific deliberation?") grouped into six categories:

1. *Deliberation Process Structure:* Questions about the stages, timeline and organization of the deliberation processes.
2. *Participant Information:* Questions about the individuals and organizations involved in deliberations.
3. *Contributions and Arguments:* Questions about the content, structure and relationships of the deliberative contributions.
4. *Information Resources:* Questions about the documents, legal sources, and other information referenced in the deliberations.
5. *Fallacy Detection:* Questions about the identification and classification of logical fallacies in arguments.

[7] `https://github.com/Stocastico96/Deliberation-Knowledge-Graph`

6. *Cross-Dataset Integration:* Questions about the standardization and mapping of deliberation data across different platforms.

The nonfunctional requirements include compatibility with existing platforms, extensibility, reuse of existing ontologies, multilingual support, and consistency across data sources.

### 3.3 Ontology description

The Deliberation ontology is organized around three core models:

1. *Process Model*: Represents deliberation processes, their stages, timelines, and organizational context.
2. *Participant Model*: Represents individuals, groups, and organizations involved in deliberations, along with their roles and relationships.
3. *Contribution Model*: Represents arguments, positions, and other contributions made during deliberations, including their structure and relationships.

The OWL ontology is publicly available online[8], along with its documentation[9].

In Figure 1, the key entities in the Deliberation Ontology are represented. The Ontology contains three main models: Process, Participation and Argument, representing the three ingredients relevant to every public deliberation process. The Knowledge Graph is populated in two different forms. First, harvesting from public sources will create data related to the process and the participation. Second, an analysis of this objective data will create the data on the arguments. In the diagram, the dotted red line divides the Data Layer, obtained directly from the sources, from the Analysis Layer, which is obtained after processing the first one.

The Deliberation ontology reuses and aligns with several existing ontologies:

- *FOAF (Friend of a Friend):* For representing people and their relationships.
- *Dublin Core:* For metadata about resources.
- *SIOC (Semantically Interlinked Online Communities):* For online discussion structures.
- *AMO (Argument Model Ontology):* For argument structures.
- *SKOS (Simple Knowledge Organization System):* For concept schemes and taxonomies.
- *Time Ontology:* For temporal aspects of deliberation processes.
- *Organization Ontology:* For organizational structures and roles.

[8] `https://w3id.org/deliberation`
[9] `https://w3id.org/deliberation/ontology`

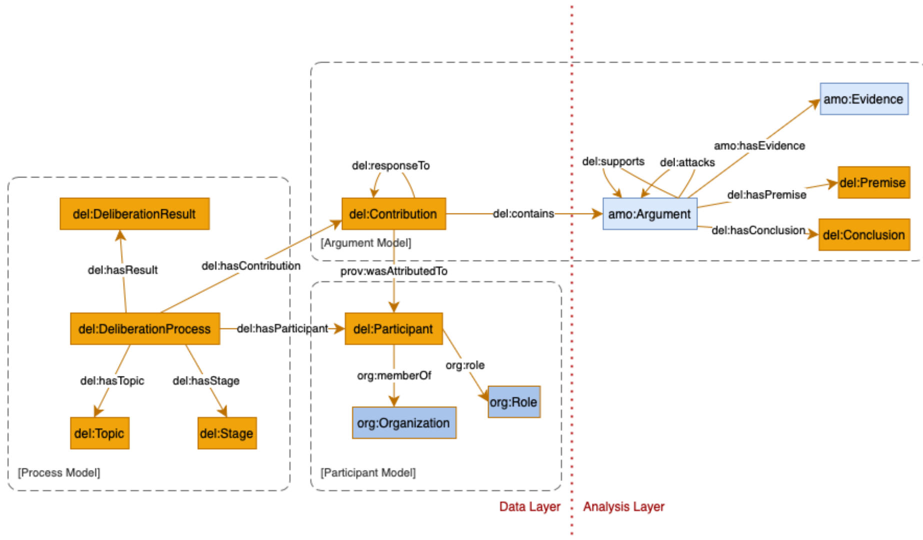


**Fig. 1.** Representation of the key entities in the Deliberation Ontology and the relationships between data layers.

## 4 The Deliberation Knowledge Graph

### 4.1 Data Sources

Choosing the right sources for a knowledge graph is not a trivial issue, and a systematic procedure should be followed [16]. However, at this stage, where a proof-of-concept is sufficient, we have selected several deliberation datasets based on their availability and their ability to represent the different types of deliberative processes:

- **European Parliament Debates:** This dataset consists of verbatim reports of plenary sessions from the European Parliament, published in HTML format and updated daily, as open government data. The data represents formal institutional deliberation at the European level, with structured transcripts of speeches, debates, and procedural elements.
  *Alignment:* The dataset maps to our model with Speaker → del:Participant (including role and political group affiliation), Speech → del:Contribution, Debate → del:DeliberationProcess, and Topic → del:Topic. The temporal structure of debates is captured through del:startDate and del:endDate.
- **Decide Madrid:** This dataset is sourced from Madrid's official citizen participation platform, containing proposals, debates, and comments submitted by citizens. Available as Open Data, it includes structured CSV files of citizen proposals and associated comments, with fields capturing user information, proposal content, voting data, and discussion threads. The platform generates new data continuously as citizens engage with municipal issues.

*Alignment:* The dataset maps to our ontology with author_name → del:Participant, Proposal/Comment → del:Contribution, and Debate → del:DeliberationProcess. The support/voting mechanism is captured through del:supports relationships, while the threaded nature of discussions is represented through del:responseTo properties.

– **EU Have Your Say:** This dataset comes from the European Commission's public consultation platform, which collects citizen and stakeholder feedback on EU initiatives and policies. We gathered them using an API that permits the download of CSV files and a SQLite database containing feedback submissions, initiative descriptions, and metadata about contributors. The platform continuously accumulates new data as the Commission launches new consultations and stakeholders provide input.

  *Alignment:* The dataset maps to our model with Feedback → del:Contribution, Initiative → del:DeliberationProcess, Contributor → del:Participant, and Policy Area → del:Topic. The formal structure of EU consultations is represented through del:Stage entities, while the relationship between feedback and initiatives is captured through del:hasContribution properties.

– **DeliData:** [17] This research dataset focuses on deliberation in multi-party problem solving, created by Karadzhov et al.. It contains structured records of group deliberations with detailed annotations of message types, deliberation patterns, performance metrics and multi-level deliberation annotations.

  *Alignment:* The dataset maps to our ontology with Participant → del:Participant, Message → del:Contribution, Group Chat → del:DeliberationProcess, and Annotation Types → del:ArgumentStructure.

– **Habermas Machine:** [18] This dataset derives from a deliberative democracy experiment performed by Google DeepMind labs, based on Habermas's theories of communicative rationality. Stored in Parquet format, it contains pairwise comparisons between options, preference rankings, position statement ratings, and survey responses from participants in structured "deliberation" exercises. The dataset captures how preferences evolve through the processes, with particular emphasis on preference formation and decision-making dynamics.

  *Alignment:* The dataset maps to our model with Participant → del:Participant, Position Statement → del:Position, Comparison → del:Argument, and Deliberation Round → del:Stage within a broader del:DeliberationProcess. The preference rankings provide data for del:supports relationships, while the structured nature of the experiment maps clearly to the stage-based process model in our ontology.

– **US Supreme Court Arguments:** This dataset contains, in CSV format, transcripts of oral arguments before the United States Supreme Court from 2017-2021. Available as public domain government works, it provides verbatim accounts of legal deliberation at the highest judicial level, including questions from justices, responses from attorneys, and the complete flow of legal argumentation. Each transcript includes case metadata, speaker identification, and the full text of exchanges.

*Alignment:* The dataset maps to our ontology with Justice/Attorney → del:Participant (with appropriate del:Role), Statement → del:Contribution, Case → del:DeliberationProcess, and Legal Question → del:Topic. The adversarial nature of legal argumentation is captured through del:supports and del:attacks relationships, while references to precedents and statutes are represented through del:references connections to del:LegalSource entities.

- **Decidim Barcelona:** This dataset comes from Barcelona's implementation of the Decidim open-source participation platform, representing digital deliberation at the municipal level. Available under CC-BY licence in CSV format, it contains structured data on proposals, debates, participatory processes, assemblies, consultations, and user interactions. The platform generates continuous data on citizen engagement with urban governance, capturing both formal and informal deliberative processes.
  *Alignment:* The dataset maps to our model with User → del:Participant, Proposal/Comment → del:Contribution, Participatory Process → del:DeliberationProcess. The platform's multi-level participation structure is represented through nested del:Stage entities, while the various forms of user engagement are captured through specialized subtypes of del:Contribution.

These mappings enable the transformation of heterogeneous data into a unified representation based on the Deliberation ontology.

### 4.2 Harvesting and conversion

We developed data conversion pipelines for each dataset to transform the original data into RDF format aligned with the Deliberation ontology. The general process includes:

1. **Data Extraction:** Extracting data from the original source (HTML, CSV, JSON, etc.).
2. **Data Cleaning:** Cleaning and normalizing the data to ensure consistency.
3. **Entity Identification:** Identifying key entities (participants, contributions, topics, etc.).
4. **Relationship Extraction:** Identifying relationships between entities.
5. **RDF Conversion:** Converting the data to RDF format aligned with the Deliberation ontology.

For each dataset, we created specific conversion scripts tailored to its structure and content.

These tools are implemented in Python using libraries such as BeautifulSoup for HTML parsing and RDFLib for RDF manipulation. The tools are designed to be modular and extensible, allowing for the addition of new data sources and formats. The code is available in a Github repository.[10]

[10] `https://github.com/Stocastico96/Deliberation-Knowledge-Graph`

### 4.3 Data Storage and Publication

The integrated RDF data will be stored in a triple store (Virtuoso Open Source) that provides SPARQL query capabilities. The triple store will be exposed through a SPARQL endpoint that allows for complex queries across the integrated datasets. The data will also available as downloadable RDF dumps for offline analysis.

We developed a web-based query interface that allows users to explore the integrated deliberation data through predefined queries and visualizations. The interface will provide:

- Basic search functionality for finding deliberation processes, participants, and contributions.
- Advanced query capabilities using SPARQL for complex analysis.
- Visualizations of deliberation structures, participant networks, and argument flows.
- Export options for query results in various formats (CSV, JSON, RDF).

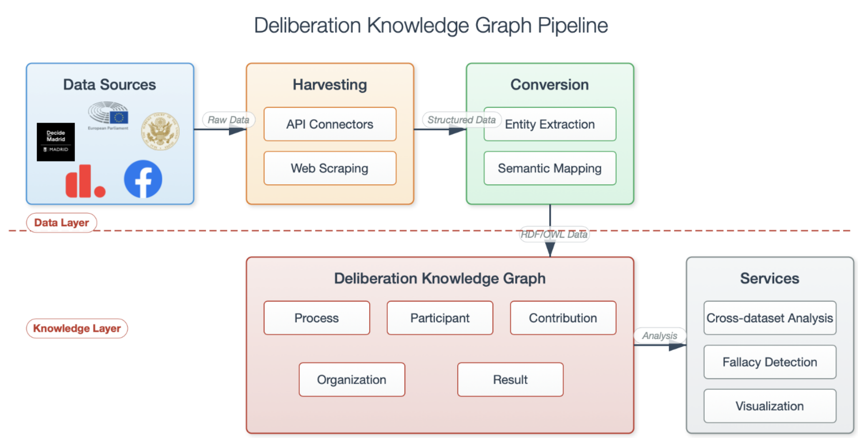


**Fig. 2.** represents the pipeline for the creation of the Deliberation Knowledge Graph. It shows the different sources from which data is harvested, the pre-processing and the mapping to the Deliberation Ontology, upon which several services can be built.

### 4.4 Technical Implementation

The technical implementation of the DKG includes the ontology implementation, data conversion tools, and, in the future, a query interface.

The Deliberation ontology is implemented in OWL 2 (Web Ontology Language). The three models are implemented as a single file and published with a persistent URI: `http://w3id.org/deliberation/`

## 5 Related Work

Several ontologies have been developed to represent aspects of deliberation and argumentation. However, each has limitations that the DKG aims to address.

### 5.1 Existing Deliberation Ontologies

**DELIB Ontology** The DELIB Ontology [19] models e-participation deliberation processes with social media integration. It explicitly supports dual e-participation (government and citizen-led) and connects deliberation with social media content. However, it focuses primarily on electronic participation and lacks detailed representation of legal frameworks. It is not maintained or available.

**Deliberation Ontology** The Deliberation Ontology by Panagiotopoulos et al. [20] supports public decision-making in policy deliberations with a strong focus on legal information integration. However, it adopts a government-centric approach with limited participant modeling and does not account for informal deliberation spaces. It is not maintained as well.

**Argument Representation Ontologies** The Argument Interchange Format [21] Ontology provides a sophisticated model for argument structure and relations, capturing support/attack relationships with a strong theoretical foundation. Also the Argument Model Ontology (AMO) [11] has been developed for the same goal. However, they focuses only on argumentation, not broader deliberation processes, and has limited integration with other aspects of deliberation.

The Issue-Based Information System (IBIS) [22] models issues, positions, and arguments with a simple, intuitive structure. However, it has limited expressivity for complex deliberations and lacks participant or process modeling.

**Related Domain Ontologies** The Semantically Interlinked Online Communities (SIOC) ontology [23] describes online discussion information structure and is widely used in social media applications. However, it is not specifically designed for deliberation and lacks political and legal conceptualization.

The Legal Knowledge Interchange Format (LKIF) [24] facilitates communication between legal knowledge systems with comprehensive legal information modeling. However, it is highly specialized for the legal domain and lacks direct connection to civic participation concepts.

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[11] `https://sparontologies.github.io/amo/current/amo.html`

**PAKT Framework** The PAKT (Perspectivized Argumentation Knowledge Graph) by Plenz et al. [25] represents arguments with premises and conclusions while connecting them to author perspectives, values, and frames. Although not formally an ontology, it demonstrates how knowledge graphs can reveal patterns in deliberative discourse. However, PAKT focuses on analyzing existing debates rather than standardizing deliberation across platforms.

### 5.2 Limitations of Existing Approaches

Despite the availability of multiple ontologies in related domains, a unified Deliberation Knowledge Graph is necessary for several reasons:

1. **Integration Gap:** None of the existing ontologies adequately bridges formal institutional deliberation with civic participation platforms.
2. **Maintainance:** Most of the solutions that tried to map the deliberative processes are not maintained or available in machine-readable format.
3. **Cross-Dataset Standardization:** Current deliberation data exists in heterogeneous formats across platforms, requiring a common semantic framework.
4. **Fragmentation:** Each existing ontology covers only part of the deliberation ecosystem, lacking a comprehensive framework.
5. **Fallacy Detection Support:** Existing ontologies lack the specific structures required for computational identification of logical fallacies in deliberative discourse.
6. **Multi-perspective Integration:** Existing approaches typically adopt either a government-centric or citizen-centric perspective, not both.
7. **Technical Evolution:** New deliberation platforms and technologies emerge regularly, requiring a modular and extensible approach.
8. **Research-Practice Gap:** Current ontologies are either too theoretical or too implementation-specific.

The DKG addresses these limitations by providing a unifying semantic layer that leverages the strengths of existing ontologies while filling their gaps through a comprehensive approach to deliberation modeling.

## 6 Conclusion and Future Work

The digitalisation of public deliberation processes presents a major opportunity to enhance democratic engagement. By integrating currently fragmented sources of deliberative information and bridging the divide between institutional debates and civic participation, a wide range of new applications becomes possible. This paper has proposed a technical solution to address this challenge and discussed its benefits and limitations.

The main contributions are the Deliberation Ontology –a model that captures deliberative processes across institutional and civic contexts– and the Deliberation Knowledge Graph, a dataset connecting information from various open data sources. To support this, data conversion pipelines have been developed to integrate heterogeneous datasets, and semantic querying capabilities allow for cross-context analysis.

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