



Drammar: A Comprehensive Ontological Resource on Drama

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Abstract. This paper reports about the release of a comprehensive ontological resource on drama, called Drammar. Drama is pervasive across cultures and is realized through disparate media items. Drammar has been designed with the goals to describe and encode the core dramatic qualities and to serve as a knowledge base underlying a number of applications. The impact of the resource is displayed through its direct application in a few tasks and its extension to serve in novel projects in the digital humanities.

Keywords: Drama · Wiki · Digital humanities

1 Introduction

A drama is a story conveyed through characters who perform live actions: for example, theatrical plays (e.g., Shakespeare’s *Hamlet* in screenplay, performance, movie formats, respectively), TV series (HBO’s *Sopranos*¹), reality shows (CBS’s *Survivor*²), and some videogames (Ubisoft’s *Assassin’s Creed*³). Drama is pervasive across cultures and ages [26] as well as across media, the latter named dramatic media in [9]. A single drama can assume several forms, fulfilling a number of its core conditions. For example, the abstraction of the oral tale *Cinderella* has, e.g., Perrault’s [34] and Disney’s [1] versions.

This paper presents an ontology for describing the domain of drama, called Drammar. The encoding of the major concepts and relations of the drama domain must address a vast field of research where scholars have addressed several topical notions, such as genre or writing style. Drammar, in particular, addresses the so-called *dramatic qualities*, that is those elements that are necessary for the existence of a drama, shared by a number of analyses of drama scholarship, e.g. [14, 18, 38]. Such element, namely story units, characters or agents, actions, intentions or plans, goals, conflicts, values at stake, and emotions are partially taken into account in a number of annotation projects, where media

¹ <http://www.hbo.com/the-sopranos>, visited on 11 June 2018.

² <http://www.cbs.com/shows/survivor/>, visited on 11 June 2018.

³ <https://www.ubisoft.com/en-US/game/assassins-creed/>, visited on 11 June 2018.

chunks (e.g., text paragraphs, video segments, etc.) are annotated for the sake of studying the relationships between the linguistic expressions and the drama content.

Drammar⁴ is the first comprehensive ontology of the dramatic qualities; it makes the knowledge about drama available as a vocabulary for the linked interchange of drama encodings and readily usable by automatic reasoners.

2 Related Work on Drama Domain Encoding

In the last decade, the emerging technologies for media indexing and retrieval have prompted a number of initiatives that leverage structured representations of the dramatic content. Elson has introduced a template-based non-standardized representation language for describing the content of narrative texts, with the goal of creating a corpus of annotated stories, called DramaBank [8]; more recently, minimal annotation schemata have been targeted at grasping the regularities of written and oral narratives at the discourse level, by relying on quantitative approaches, which can overcome the difficulties of recruiting annotators [36]. All these initiatives, however, introduce representations that are task-oriented, i.e. they tend to focus on the realization of narratives through a specific medium (written tales), and lack the capability to represent the universal elements of dramatic narration that go behind the expressive characteristics of each medium, with no attempts for standardization and data linking.

In parallel with these trends in text annotation, the general media annotation has evolved towards the use of ontologies to describe the contents, given the languages and resources made available by the Semantic Web [5]. Ontologies and vocabularies have appeared that support the representation of the media content according to a shared semantics, available across the Web according to the paradigm of Linked Data [15]. In particular, semantic resources such as VERL (the Video Event Representation Language, described in [11]), provide tools for the structured description of events that can be applied also to the description of incidents in stories. A media-independent model of story is provided by the OntoMedia ontology, exploited in the Contextus Project⁵ (see [16] and [19]) to annotate the narrative content of media objects which range from written literature to comics and TV fiction. This project encompasses some concepts that are relevant for the description of drama, such the notion of character; however, being mainly targeted at the comparison of story events and timelines across media in crossmedia contexts, it lacks the capability of representing the core notions of drama. In the field of cultural heritage dissemination, the StorySpace ontology is an ontology that supports museum curators in linking the content of artworks through stories, with the ultimate goal of enabling the generation of user tailored content retrieval (see also [29]). However, the representation of story provided by StorySpace is functional to the creation of story repertoires

⁴ <http://purl.org/drammar>.

⁵ Registered at <http://lov.okfn.org/dataset/lov/vocabs/stories>, visited on 11 June 2018.

for curating activities; as such, it is not committed to a comprehensive account of the narratological theory, and lacks some crucial elements for drama ontology, such as the notion of character.

3 Drama Domain and Drammar Ontology

Drama is media independent, including Sophocles' texts, reality shows, and even some videogames within the same domain. Our approach avoids references to style and artistic qualities by aiming at representing the elements shared by different, cross-media manifestations of drama, the so-called intangible elements of such a cultural heritage form [24]. Bazin speaks of "dramatic elements" as "interchangeable between one art and another" [4]. The model of drama assumed here lays at the basis of the system intended to produce a dramatic manifestation, "an action played live by characters" [41]. Any drama, beyond the form it takes, produces in the audience the perception of something, intuitively called 'story', directly enacted by characters. Drama, differently from literature, must show some characters in their actions and such actions should not be reduced to the mere description of a movement, but to a manifestation of some intention, as discussed by Styan [39]. So, actions, organized into bounded story segments, stem (more or less straightforwardly) from characters' internal motivations and, at the same time, provide information on the characters themselves and their goals. Above all, stand conflicts: Styan opens his essay by showing the difference between an ordinary conversation and a dramatic dialogue.

3.1 The Dramatic Qualities

The dramatic qualities we are taking into account have been distilled after a thorough analysis of the drama literature and discussions between drama scholars and ontology engineers in a wiki⁶. So, although the cultural object known as "drama" includes many features that we have neglected in the representation (such as genre, topic, writing style, and even *Weltanschauung*), Drammar includes those elements that are deemed as necessary in the literature, and that can be grouped under the following four categories: *action*, *agent*, *conflict*, and *segmentation*. The description of these elements has provided the requirements for the design of the ontology; the vast literature on drama that has been reviewed is surveyed and discussed in the wiki.

Action. The word action signifies an intentional, purposive, conscious and subjectively meaningful activity. It is done by an agent and it is the expression of a will, thus involving a goal, an intentionality. It is a key concept of dramatic theory: the etymological roots of the words "drama" and "dramaturgy" themselves stem from the ancient Greek verb *dràō*, which means "to do", "to act", intended as performing an action following a human deliberation.

⁶ <https://www.di.unito.it/wikidrammar>, visited on 11 June 2018.

From the literature, we know that action is a foundational element of drama, responding to a logic of cause and effect and motivated by a character's goal. Actions are part of a character behavior that has some degree of unity and wholeness, the enactment of a character's deliberation, defining the character function in the plot.

Agent. The term “agent” is preferred to “character” because of the focus on the structural elements of the dramatic action rather than the psychological, moral, social, or political entity that comes out of the narrative as a cognitive product of the audience. From our modeling point of view, the notion of agent does not take into account the historical differences between the hero in the Greek Tragedy, the romantic protagonist, or the modern character, but we focus on its agentic qualities.

From the literature, we know that an agent has intentions and mental states, so to motivate his/her behavior, does actions, as initiators or as reactions to others' actions. An agent interacts with the environment and the other agents, and displays emotions. An agent is the medium of representation in drama.

Conflict. Conflict is the fundamental principle of dramatic theory, ubiquitous in the history of dramatic theory and critics, the expression of a tension, achieved through the opposition of characters. Conflict is traditionally indicated as the force that motivates the character's changes. Nevertheless, it reached its modern meaning only during the growth of the new “serious genre” (late 18th century), when it took on more specific and definite traits.

From the literature, we have that conflict is an opposition between agents that arises from the presence of differences in agents' goals and/or (moral, ethical, political) values or between an agent and some situation occurring. A conflict is represented by an obstacle and provokes an emotional response in the agent.

Segmentation. Since its origins, dramatic theory has considered drama as a unitary whole, but consisting of different parts. Consequently, it should be possible to segment the dramatic works in parts and analyze how these are organized in order to create the wholeness of the work. Although the literature has adopted different naming rules for the segmentation (beats, scene, sequence, acts, episode), we know that the parts of the drama are organized hierarchically; each part, at each level, has the form of the whole drama (fractal recursion). So, we resort to a more generic term to name such parts and we call them *units*. In our model of drama, the units are the containers of the agents' actions and involve reciprocal relationships, both with other units located at the same structural level, and with other higher or lower structural levels.

A short sample from Shakespeare's *Hamlet*, the so called “nunnery” scene, can clarify these elements. In this scene, situated in the Third Act, Ophelia is sent to Hamlet by Polonius (her father) and Claudius (Hamlet's uncle, the king) to confirm the assumption that Hamlet's madness is caused by his rejected love.

According to the two conspirators, Ophelia should induce him to talk about his inner feelings. At the same time, Hamlet tries to convince Ophelia that the court is corrupted and that she should go to a nunnery. In the climax of the scene, Hamlet puts Ophelia to a test to prove her honesty: guessing (correctly) that the two conspirators are hidden behind the curtain, he asks the girl to reveal where her father Polonius is. She decides to lie, by replying that he is at home. Hamlet realizes from the answer that also Ophelia is corrupted and consequently becomes very angry, realizing that there is no hope to redeem the court (and Ophelia too). The climactic incident in the scene consists of a question-answer pair:

- Hamlet: "Where is your father?"
- Ophelia: "At home, my Lord!"

This is a (very relevant) story unit: boundaries are decided through the detection of a specific goal pursuit, distinct from the goals pursued in the previous unit. Here Hamlet, one of the two characters in the unit, is pursuing the goal of proving Ophelia's honesty. Honesty is a value for Hamlet, and Ophelia's behavior is putting at stake such a value. So, he decides to pursue the goal of proving Ophelia honesty through a plan in which he asks a question he knows the answer of, i.e. the current location of her father Polonius (Hamlet is correctly convinced that Polonius is in the same room, behind a curtain), and Ophelia lies, by answering with a false location, i.e. Polonius' home. So, we can list the following elements for this unit (descriptions are provided informally, see next section for formal representations):

Action

- Dialogue between Hamlet and Ophelia (Question/Answer)

Agents

- Hamlet
 - Value at stake: Honesty
 - Goal: Prove Ophelia honesty
 - Plan or Intention: Asking Ophelia a rhetorical question
 - Plan accomplishment: failure
 - Emotions: Distress, Reproach, Anger
- Ophelia
 - Value at stake: Father's authority
 - Goal: Respect father's authority
 - Plan or Intention: Lying about presence of Polonius in the room
 - Plan accomplishment: success
 - Emotions: Disappointment, Joy, Shame

Conflict

- Hamlet who searches for honesty VS. Ophelia who lies

Segmentation

- Unit: Hamlet tests Ophelia for honesty
- Scene:
 - Ophelia tries to prove Hamlet madness is caused by rejected love
 - Hamlet tries to save Ophelia from corruption in Elsinor court

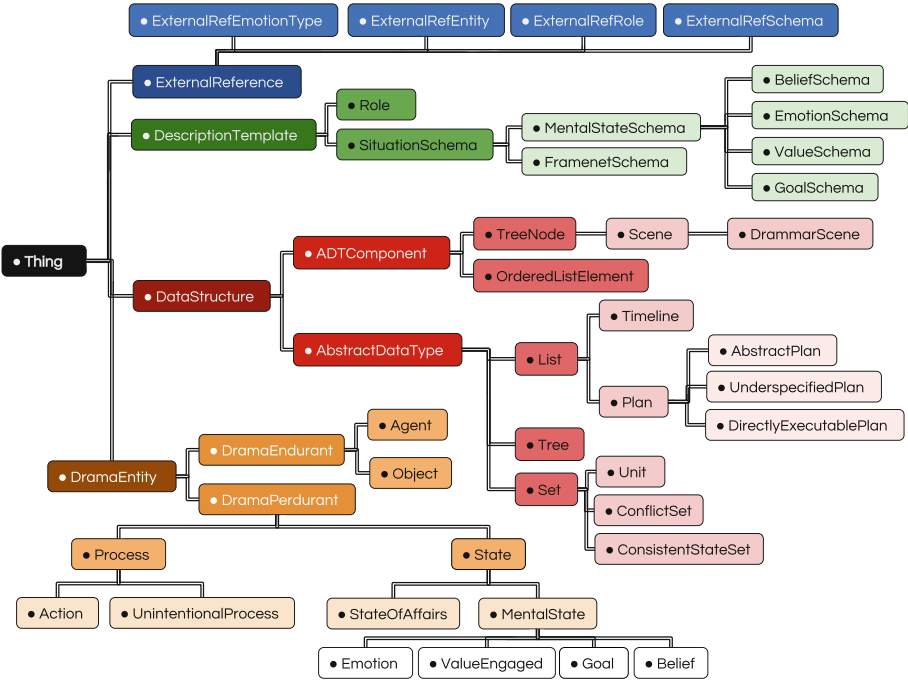


Fig. 1. Taxonomy of ontology Drammar. Colors distinguish sections of the taxonomy (four major sections); box colors desaturate while going to specific classes. (Color figure online)

3.2 The Drammar Ontology

In this section, we introduce the ontology, from the classes of the ontology organized in a taxonomy to the transversal relations over them. The resource has been growing through a number of projects that have dealt with the annotation of dramatic media [21,23], the rule-based calculation of characters' emotions [20], the characterization of drama as a form of intangible cultural heritage [24]. The resource described here is the result of a continuous stabilization due to these several projects.

The design of the taxonomy (Fig. 1) follows the well-known principle according to which a class specifies into subclasses depending on the value of a specific trait, or property. As an example, consider the class **Belief**: the concept of **Belief** is defined as the sum of the traits accumulated top-down along the taxonomy: *temporally extended entity*, for being a type of **DramaPerdurant**, *stative*, for being a **State**, *related to some agent's mind*, for being an **Belief**.

The top-level of Drammar contains four classes:

- **DramaEntity** is the class of the dramatic entities, i.e the entities that are peculiar to drama;

- **DataStructure** is the class that organises the elements of the ontology into common structures (namely, list, sets and trees);
- **DescriptionTemplate** contains the patterns for the representation of instantiated drama in terms of roles;
- **ExternalReference** is the class that bridges Drammar to commonsense concepts situated in external resources.

DramaEntity. **DramaEntity** groups all the peculiar elements that belong to the drama domain. It is divided into two subclasses, each describing specific drama elements: **DramaPerdurant** represents the temporally extended entities of a drama (subclass, `rdfs:subClassOf` of the class **perdurant** in DOLCE-Lite⁷, as described in [12]), further subdivided into the **Process** class and the **State** class. The **Process** class (subclass of class **process** in DOLCE-Lite), represents what occurs in a drama, and subsumes **Action**, i.e. the intentional processes, and **UnintentionalProcess**; intentional processes (namely, actions) are also the basic elements of agents' plans. States are interleaved with timelines (sequences of processes grouped into units) to form the dynamics of drama. As part of plans, states form their preconditions and effects. The **State** class (subclass of **state** in DOLCE-LITE) further divides according to the entity type to which the state is attributed. The entity of attribution can be agent or world, thus yielding two subclasses: **MentalState** and **StateOfAffairs**. The subclasses of the **MentalState** class, then, acknowledges the rational vs. irrational distinction. Inspired by [10], mental states are the core of the description of the intentional behavior of agents and they belong to one of the following classes: **Belief**: the agent's subjective view of the world; **Emotion**: the emotions felt by the agent; **ValueEngaged**: the values of an agent, which are engaged (put at stake or in balance, respectively) by the unfolding of the plot; **Goal**: the objectives that motivate the actions of the agents.

DramaEndurant represents the time independent entities that participate into drama perdurants (corresponds to, that is `rdfs:subClassOf` the class **endurant** in DOLCE-Lite [12]); such entities are agents (class **Agent**) and objects (class **Object**), kept distinct from each other by the feature of intentionality: agents intentionally perform actions, while objects are simply involved in the actions (often called "props" in drama production).

DataStructure. Class **DataStructure** encodes the structures that provide an organization to the elements of drama. This class includes abstract data types (subsumed by the **AbstractDataType** class), i.e. ordered lists (**List** class), unordered sets (**Set** class), and hierarchical trees (**Tree** class), and their components (subsumed by the class of abstract data type components, **ADTComponent** class), such as list elements (**OrderedListElement**), set members (**SetMember**), and tree nodes (**TreeNode**). **List** is inspired by a well-known ontology, the Ordered List Ontology⁸, originally developed as part of the Music Ontology [37],

⁷ <http://www.loa.istc.cnr.it/ontologies/DOLCE-Lite.owl>.

⁸ <http://purl.org/ontology/olo/core#>.

being music an intrinsically sequential medium; its implementation in Drammar makes some simplifications (e.g., indexes are not included), while defining a number of structures as subclasses of the `List` class. Drammar `List` is a subclass of the `Ordered List` class in OLO (`drammar:List rdfs:subClassOf olo:OrderedList`); then, plans (class `Plan`) are lists of simpler plans (or actions), timelines (class `Timeline`) are lists of units. Precedence relations are encoded for the list elements, and the first and last element of a list can be marked. Plans are further subdivided into abstract plans (class `AbstractPlan`), which represent long term intentions consisting of simpler plans, and directly executable plans (class `DirectlyExecutablePlan`), which represent short term intentions consisting of immediate actions to execute. `Set` includes structure types that gather elements of the same type (instances of the `SetMember` class, a type of data type component, or `ADTComponent` class), but where ordering is irrelevant. This is the case of units (`Unit` class), i.e., sets of processes which compose the timelines, and of state sets, which provide the precondition and effects of timelines and plans. State sets can be internally consistent (`ConsistentStateSet`), or can include conflicting elements (`ConflictSet`). The first type provides the preconditions and effects of timeline, which are typically internally consistent (in drama, as in the real world), while the latter serves the function of modeling the conflicts which may arise from the intentions (i.e., plans in Drammar) of different characters. `Tree` represents tree-like structures. In drama, tree-like structures are needed to represent the notion of scene: a scene, of larger or smaller granularity, can subsume other scenes, and can be subsumed by larger scenes. A tree contains instances of the `TreeNode` class, a type of `ADTComponent`. A `Scene` is a type of `TreeNode`; a `DrammarScene` is a scene defined on conflicts.

ExternalReference. Class `ExternalReference` bridges the representation of drama onto the commonsense and linguistic concepts stored in external resources. External vocabularies, such as SUMO (Standard Upper Merged Ontology, [32]) or FrameNet [3], are not directly re-used in the ontology, The `ExternalReference` class is characterised by data properties whose values point to the IRIs (or identifiers, where an IRI is not available, as in the case of WordNet⁹) of the concepts in the external resources. These properties, all subsumed by the `quale` datatype property, are intended by design to point at specific vocabularies: *quale_YAGOSUMO_concept* for the YAGOSUMO ontology; *quale_MWNSense* for MultiWordNet senses (the multilingual alignment of WordNet [35]); *quale_framenetFrame* for FrameNet. By doing so, the representation of every manifestation of drama, will be unambiguously linked to a vocabulary term on the web (or to some inner identification system of a publicly available resource when the resource itself is not available as Linked Data).

⁹ <https://wordnet.princeton.edu>.

The `ExternalReference` class is divided into subclasses: `ExternalRefEntity` maps a perdurant (process or state) or an endurant (agent or object) onto its description: for instance, the mapping target may be the identifier of a lexical entry for describing a process (e.g., “kill” in WordNet), or the IRI of an ontology class for describing an object (e.g., concept “Weapon” in SUMO). `ExternalRefSchema` maps a process or state onto a verbal frame that describes it according to a role structure, with the `ExternalRefRole` to map the single roles onto their description in the frame (for example, the frame for “Killing” and the “Killer” role, respectively, in FrameNet). `ExternalRefEmotionType` maps the emotions of the characters (e.g., `Fear`) onto a reference model of emotions, namely Ortony, Clore, and Collins’ model, known as OCC [31]. Here is a representation sample, namely the representation of attribute *prince* for individual Agent *Hamlet* in the instantiated drama ontology (the complete encoding example is published on the web site):

```
1 ### http://www.cadmos.cirma.unito.it/drammar.owl#ExtRef_prince
2 drammar:ExtRef_prince rdf:type owl:NamedIndividual ,
3 drammar:ExternalRefEntity ;
4 drammar:originalTerm "principe"^^xsd:string ;
5 drammar:quale_MWNSense "{n#07498573} prince"^^xsd:string ;
6 drammar:quale_YAGOSUMO_concept "yago:YagoLegalActor"^^xsd:string .
```

The individual `ExtRef_prince` works as a pointer to the `synset n#07498573` in MultiWordNet (line 5), which corresponds to the meaning intended by the annotator with the word “principe” (Italian for “prince”, stored in the `originalTerm` data property, line 4), and, by broader match, to the concept of `LegalActor` in YAGO (line 6), which is retrieved from the endpoint SPARQL of the ontology.

DescriptionTemplate. Class `DescriptionTemplate` contains the patterns for encoding the role-based schemata. It has the purpose of mapping a situation (as intended in [13]), be it a process or state, onto its linguistic description. Its subclasses, namely `Role` and `SituationSchema`, provide the primitives to realize a role schema for describing the situation. The `SituationSchema` class represents the description of a situation in terms of the roles involved in it (see the Situation Description ontology pattern [13]). This class is related to the `Role` class through specific properties. Class `SituationSchema` divides into subclasses for representing specific schema types: `FramenetSchema`, for mapping the description of entities onto the linguistic reality encoded in lexical-semantic resources, e.g., FrameNet [3]. `MentalStateSchema`, for mapping the description of a mental state onto specific schemata for the different types of mental states, each of which is committed to a specific model. The `MentalStateSchema` further specifies into `BeliefSchema`, `EmotionSchema`, `GoalSchema`, `ValueEngagedSchema`. For example, the `ValueSchema` relates an agent’s value engaged in a given timeline or plan (`ValueEngaged`) with some reference value system (which may be shared by agents).

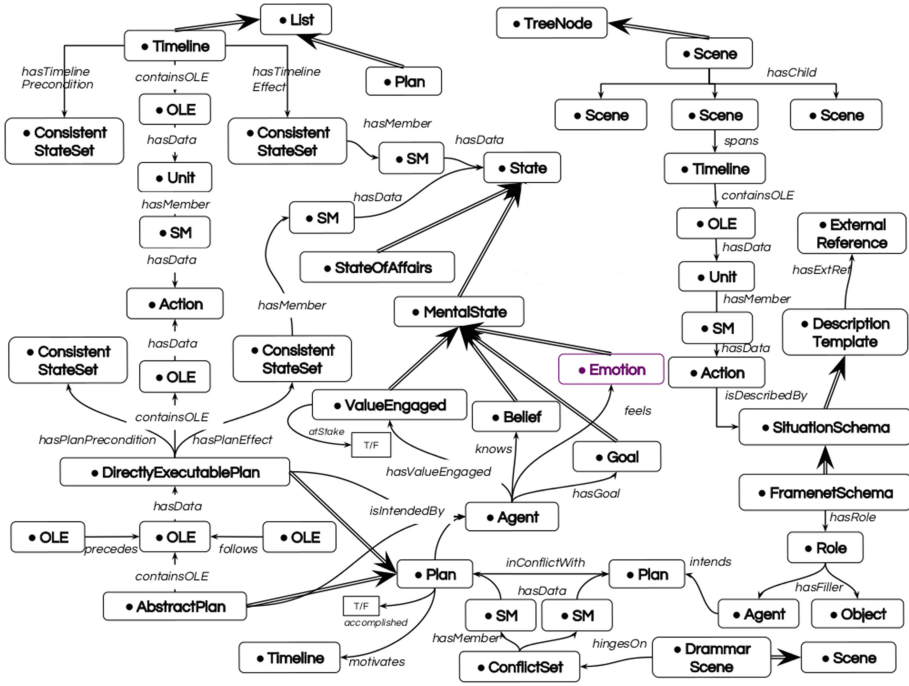


Fig. 2. Overview of Drammar. Double lines represent subsumption (fragments of the taxonomy above); solid lines represent object properties; OLE stands for class OrderedListElement; SM stands for class SetMember.

3.3 Design and Engineering of Drammar

The axioms of the Drammar ontology encode each drama element through a pattern of classes and properties, resorting to Artificial Intelligence theories and models. Figure 2 provides an overview of the ontology properties: on the left side, the timeline of incidents grouped into units (upper part, left), connected with the agents' intentions (or plans, lower part, left) through the concept of action (middle part, left); on the right side, the hierarchical scene structure (upper part, right), connected to the patterns for describing actions (lower part, right), which assign roles to agents; the middle of the figure describes the agent, with its conflicts (lower part, middle), and mental states (middle). The *Timeline* is the closest element to the drama document (a literary text or an audiovisual medium), a succession of the incidents (or *Actions*) that happen in the drama. Incidents are assembled into discrete structures, called *Units*. Each succession of incidents forms a sub-timeline of the whole timeline of the drama. This level is formalized through the Situation Calculus paradigm [27]: with sub-timelines that function as operators advancing the story world from one state to another (states aggregated in *ConsistentStateSets*), that work as preconditions and effects of some sub-timeline of incidents. The actions result from a deliberation process of the

Agent, which centers upon the notion of the character's intention in achieving (or trying to achieve) a *Goal*. The intention, or the commitment of the character, is represented by a *Plan*, which consists of the actions that are to be carried out in order to achieve some goal; plans are organized hierarchically, with high-level behaviors (*AbstractPlans*) formulated as lists of lower-level plans, or subplans, until the *DirectlyExecutablePlans*, which directly contain actions. Goals originate from the values of the characters that are put at stake and need to be restored (*ValueEngaged*), given the *Beliefs* (i.e. the knowledge) of the agents. This level is formalized through the rational agent paradigm, or BDI (Belief, Desire, Intention) paradigm [6] (which is also applied in the computational storytelling community [30, 33]). So, an agent is characterized by goals, beliefs, values engaged, emotions, and plans; values can be *atStake* (true) or in balance (*atStake* false); plans can be in conflict with other plans, possibly of other agents; a conflict set aggregates all the plans, agents, and goals that determine a dramatic scene (*DrammarScene*), through the game of alternate accomplishments. A plan *motivates* the existence of a (sub)timeline, has preconditions and effects, which are consistent sets of states, and can be *accomplished* or not. Finally, scenes, defined by the author or perceived by the audience, to appropriately segment the timeline, are recursively composed of daughter scenes. A scene *spans* a timeline, that is a sequence of units. Some scenes are *DrammarScenes*, meaning that they are motivated by some conflict over the characters' intentions.

The development of Drammar can be described through the NeOn ontology engineering methodology [40], thanks to its flexibility and its focus on the relation of the ontology with non-ontological resources, such as linguistic and other semantic resources. Geared to a networked world, NeOn consists of a set of scenarios for the development of ontologies in a collaborative way. Briefly, the NeOn methodology maps a set of *activities* onto 9 *scenarios* for building and maintaining ontologies and ontology networks. In line with the spirit of the NeOn, only some specific scenarios and activities specifically apply to the design and development of Drammar. In particular, Scenario 1 (*From Specification to Implementation*), Scenario 2 (*Reusing and re-engineering non-ontological resources*), Scenario 5 (*Reusing and Merging Ontological Resources*), Scenario 7 (*Reusing ontology design patterns*) and Scenario 9 (*Localizing Ontological Resources*) were relevant for Drammar. For example, in accordance with the prescribed activities for the scenario 2 *Reusing and re-engineering non-ontological resources* (*Searching non-ontological resources*, *Assessing the candidate non-ontological resources* and *Selecting the most appropriate ontological resources*), the available resources were surveyed and selected by taking into account the requirements for drama description: in particular, given the focus on the representation of incidents in the annotation of drama, linguistic resources for the representation of processes and events were privileged with respect to less structured lexical-syntactic resources. Based on the survey, we selected a set of non-ontological semantic resources, such as lexical-semantic resources, to cope with linguistic counterpart of the elements of drama, and we developed an interface with these resources: WordNet and MultiWordNet [28, 35], for the lexical description of incidents (actions and

events); FrameNet, for their description in terms of their argument structure [3]; VerbNet [17], for the verbal forms not indexed by FrameNet.

The concepts and relations of the ontology Drammar are written in OWL DL; the extension in [20] was encoded into OWL2 RL (Rule Language). Ontology Drammar is available at the url <http://purl.org/drammar>, under the license Attribution 4.0 International (CC BY 4.0). This license allows anyone to share the original ontology but prohibits to distribute modifications of the ontology. Though this may limit the reusability of this resource, it is important to notice that Drammar has a theoretical background that addresses a specific scholarship; this is why we decided to disallow free changes in the distribution. Of course, people can build a novel ontology and depart from some core aspects of Drammar. The canonical citation for Drammar is “Vincenzo Lombardo, Rossana Damiano, Antonio Pizzo. Drammar: a comprehensive ontology of drama (2018). <http://purl.org/drammar>”. A LODE documentation¹⁰ is online and reachable from the resource url¹¹. Drammar was also submitted for inclusion to LOV registry.

4 Impact of Drammar

Drammar is the first extensive ontology on drama and storytelling that covers whatever is intended as a dramatic quality, as demonstrated by the thorough analysis produced by the wiki (See Footnote 6). The wiki, through the analysis of a vast literature on drama, claims a number of statements. These statements have been translated into proto-axioms (i.e., axioms expressed in a controlled natural language) and then into formal axioms. These were conceived through a collaboration between two ontology engineers and one drama scholar (namely, the authors); then, on the one side, postdoc scholars from the humanities have validated the resource through the encoding of Stanislavsky’s Action Analysis, useful in perspective for supporting actor rehearsals and drama staging [2], and the creation of a sample of metadata annotations for teaching purposes [22]; on the other side, researchers from computer science have applied the metadata annotation for the devise of SWRL rules for the computation of characters’ emotions [20], the realization of printed charts of the characters’ intentions aligned with the timeline of incidents [25] the characterization of the status of an annotated document [21], the preservation of drama as a form of intangible cultural heritage [24]. Further extensions of the resource, as well as the correction of errors and inconsistencies, can be addressed by starting from the update of the wiki, which is easily accessible to drama scholars, with limited competence on formal languages.

Resources of this kind are claimed to be of great importance for the researchers in the digital humanities: as discussed by Varela [42], semantic web technologies and ontologies in particular are suitable to represent disagreement in performance interpretations. Leveraging on the Richard Schechner’s web diagram for the representation of the theory of performance, Varela claims that the

¹⁰ See <http://www.essepuntato.it/lode>, visited on 11 June 2018.

¹¹ <http://purl.org/drammar/lode>.

semantic web is better suited to represent the knowledge of theatre and performance; in particular its fractal nature addresses the atmosphere of “sophisticated disagreement” that characterizes performance research [42, p. 136]. The notion of theatre and drama does not manifest in an item or an event sufficiently unified and standardized to be represented via a conventional database. In Varela’s terms “the advantage of an ontology is that several aspects of these disagreements could be captured in a structured, systematic way” [42, p. 139]. Semantic web technologies, and ontologies in particular, are suitable to represent performance interpretations through the possibility of sharing the terminology through several approaches and the possibility for instances to belong to multiple classes scattered through several ontologies, though maintaining the original meaning cross-culturally. The ontological approach may also overtake a probabilistic-quantitative methods, as claimed by [7]: “they [the quantitative methods] fail to catch the intrinsic intentional and semantic nature of many literary phenomena [that can] be attained and made explicit and computable using a mixed human-machine approach, like that required by ontology modeling” [7, p. 30]. In other terms, the mixed human-machine approach described by Ciotti, accounts for the need of a human interpretation of the cultural object represented, and therefore pairs with the “sophisticated disagreement” described by Varela. The computational ontology is claimed to be the right method to get a representation that describes the domain of drama (and its intention-based actional nature) and that includes the human variations without disrupting the consistence of the model. Finally, there is a vast interest in the media and storytelling community for structured and semi-structured data sources. For storytelling (a larger category than drama), the effort has been in the creation of semi-structured resources that are available as specialized web sites, such as TV tropes¹² and fan fiction¹³. These sources benefit from the publication of the Drammar ontology because of the realization of a common ground for the definition of tropes, on top of the core dramatic elements and the capability to link several sources.

About maintenance and sustainability, we have proceeded through two initiatives. First, the latest release of the resource has appointed the CIRMA institution of the University of Turin¹⁴ as publisher and responsible for the maintenance of the resource through its Scientific Committee, semesterly called to debate about improvements and updates due to local annotation projects. Second, we have launched the POP-ODE initiative [22], for the collection of a large corpus of encoded works through crowdsourcing. The POP-ODE toolkit consists of a number of tools and workflow (POP-ulating Ontology Drammar Encodings)¹⁵ It includes a friendly interface and a visualizer to ease the work of annotators from the area of humanities.

¹² <http://www.tvtropes.org>.

¹³ <https://www.fanfiction.net>.

¹⁴ <http://www.cirma.unito.it>.

¹⁵ Downloadable at the url http://www.cirma.unito.it/drammar/popode/popode_folder.zip.

A few well-known models have been reused: for example, the Ordered List Ontology (see above), in the case of the sequential structures (e.g., for timeline and plans). However, for other well-known cases, we decided not to proceed. Drammar is a specific core ontology for drama; probably, in the encoding of a specific drama (in the annotation task) other well-known models (such as, e.g., FOAF, for describing people, or PROV-O, for provenance information) can be relevant (e.g., in the drama “Hamlet”, king Claudius is the uncle of Hamlet and assassin of his father); however, we have focused on the structural components of drama and their relations; so, for the annotation task, all the models that refer to commonsense knowledge should be included.

The Drammar ontology is also the base for a cataloguing and access portal project carried out by a consortium of companies from the movie industry as well as in the ICT sector. Ongoing project Smart-DH¹⁶ (Smart Digital Heritage) aims at building an archive of Italian movies owned by the Augustus Color company, segmented for scenes and tagged according to an annotation schema built on top of the Drammar ontology.

5 Conclusion

This paper has described the ontological resource on drama called Drammar. Drammar has been realized through a collaboration of computer scientists and drama scholar through a wiki platform, for the exchanging of definitional ideas and the encoding of axioms. The ontology has been applied to a few tasks, namely reasoning about characters’ emotions, graphical display of characters’ intentions, encoding of action analysis for rehearsals. The creation and maintenance of software tools for easing the annotation tasks prompt a crowdsourcing initiative for the gathering of a tagged dataset of drama, for research and teaching purposes in the digital humanities.

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¹⁶ <http://illogic.xyz/2018/05/10/smart-dh/>.

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