

## ARGUMENTATION SYSTEMS AND ONTOLOGIES FOR ENHANCING PUBLIC PARTICIPATION IN THE LEGISLATION PROCESS

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*Argumentation systems and ontologies have the potential to support and enhance the participation of citizens in the development of effective and acceptable legislation concerning the complex and multidimensional problems that modern societies face. However, this potential has only to a very small extent been explored and realized. In this direction this paper describes an investigation of this potential, which is performed as part of the EU funded project LEX-IS. The main objective of LEX-IS is to improve the legislation process in the National Parliaments through enhanced public participation in the preparatory stages (legislation proposal formation and public debate of draft legislation) with the use of state-of-the-art ICT-tools and methodologies. This paper introduces four scenarios of public participation in above mentioned preparatory legislation processes thereby exploring the support of argumentation systems and ontologies. Along the scenarios, peculiarities of these two preparatory and highly significant stages of a legislation process are discussed, and results of existing relevant research are reflected. The basic features, advantages and disadvantages of each scenario are shown, and the LEX-IS design is sketched.*

### 1 Introduction

Information and communication technologies (ICT) have the potential to support and enhance the participation of citizens in the formulation of public policies and legislation. They open new channels of communication between citizens, politicians and public administration. Likewise, they should help to overcome the lack of support and trust in the political system and the negative attitude towards politics, which can be observed in many countries [1-3]. According to the OECD ‘all OECD member countries recognise new ICTs to be powerful tools for enhancing citizen engagement in public policy-making’ since ‘the unprecedented degree of interactivity offered by new ICTs has the potential to expand the scope, breadth and depth of government consultation with citizens and other key stakeholders during policy-making’ [2]. The European Union’s (EU) i2010 eGovernment Action Plan stresses that ‘ICT has great potential to involve large numbers of citizens in public debate and decision making, from municipal to European level’, and it defines the full exploitation of the capabilities offered by ICT for ‘strengthening participation and democratic decision making’ as one of its basic priorities [3]. Various types of ICT tools and applications are reported in the literature as having potential to support and enhance citizens’ engagement in all the stages of public

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policy-making [1,2,4-8]. In [7], four phases of public participation are mentioned as to be facilitated with ICT: ‘e-Informing’, ‘e-Consulting’, ‘e-Collaborating’ and ‘e-Empowering’.

Although the literature recognizes and emphasizes the high potential of ICT for supporting and enhancing public participation in policy-making, it has not been sufficiently investigated in more detail so far. For example, in [8] the OECD expresses a lack of experiences to date in this area. Only to a very small extent are investigations being made on how particular ICT can be used for supporting and enhancing particular public participation processes, how useful ICT can be thereby, what value ICT can generate in various participation situations, and what the main determinants of this value are. The paper at hand contributes to bridging this gap. It investigates the potential of two important ICT tools for participatory processes, namely argumentation systems and ontologies. The public policy process to be facilitated is the legislation process, which should reach enhanced public participation through sophisticated ICT support. The work is performed within the project LEX-IS<sup>6</sup>, which is part of, and co-funded under the ‘eParticipation’ Preparatory Action of the European Commission [9]. The main research question is to identify and design the best ways of using argumentation systems and ontologies for supporting and enhancing public participation in the two basic preparatory stages of the legislation process (the legislation proposal preparation stage, and the public debate of a draft legislation).

The paper is structured as follows: Section 2 briefly describes LEX-IS’ objectives, methodology, and technical architecture. In section 3, the basic characteristics and specifics of the above mentioned two stages of the legislation process are presented, followed by a number of scenarios that have been developed concerning the use of argumentation systems and ontologies in these stages. Section 4 summarizes the findings to date.

## **2 Objectives, methodology, and technical architecture of LEX-IS**

The main objective of LEX-IS is to improve the legislation process in the National Parliaments through enhancing public participation with the use of state-of-the-art ICT-based tools and methodologies in its two preparatory stages: the legislation proposal formation, and the debate on draft legislation. These objectives will be achieved through:

- Modelling of the processes followed during the above two preparatory stages of the legislation process using workflow modelling techniques.
- Applying existing advanced ICT-based tools and methods for modelling, managing and visualizing complex legislative frameworks and legal structures.
- Developing ontologies and metadata schemas for the semantic annotation of legal elements, so that all involved parties can easily locate and interpret the necessary information with the use of Internet-based retrieval tools.
- Providing electronic channels for substantial participation of citizens, businesses and non-governmental organizations in these two stages (e.g. appropriate argumentation systems).

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<sup>6</sup> Full name is: ‘Enabling Participation of the Youth in the Public Debate of Legislation’ among Parliaments, Citizens and Businesses in the European Union. For more details see: <http://www.eu-participation.eu/lex-is/>.

The project is implemented by a consortium consisting of ICT companies and academic institutions with proven experience in e-Government and e-Participation, as well as National Parliaments from EU Member States. The overall approach is phased into five workpackages (WPs): 1) Baseline Definition, i.e. modelling of the processes of the two preparatory stages of the legislation process, identification of the various user groups and specification of their requirements, and design of the use of argumentation systems and ontologies; 2) Platform Adaptation; 3) Pilots Planning, Execution and Evaluation (the pilots are going to be tested in several National Parliaments with a number of different user groups), 4) Results Viability and Dissemination and 5) Project Management.

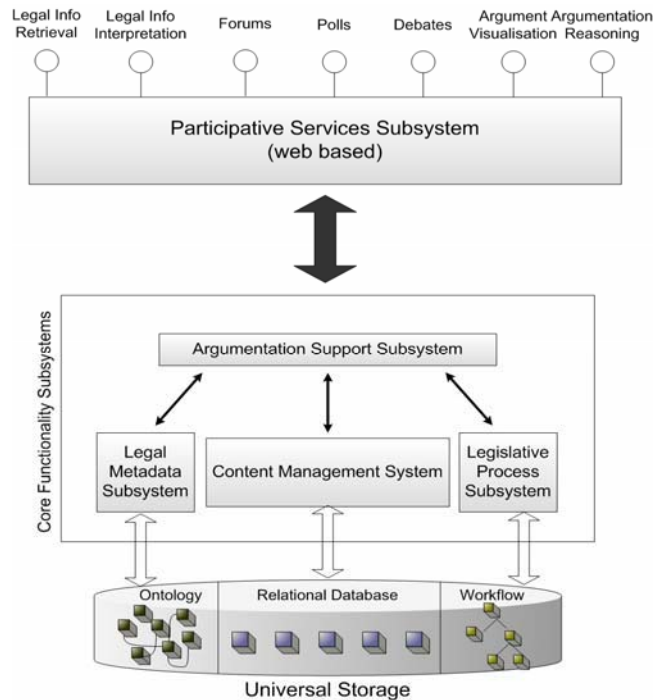


Figure 1: Technical architecture of the participation system of LEX-IS

Figure 1 shows the technical architecture of the platform on which the project will be based. It consists of three basic blocks: the Universal Storage Subsystem, the Core Functionality Subsystems and the Participative Services Subsystem (web front end).

### 3 Use of Argumentation Systems and Ontologies

To develop scenarios for the use of argumentation systems and ontologies to support the legislation proposal formation and the debate on draft legislation, the basic characteristics and specificities of these two stages have to be well understood. A conceptual model of the two processes is shown in Figure 2. The process stages are characterized by high complexity, and they consist of several sub-stages. In each sup-stage, numerous documents are produced and also many meetings take place on various topics and with various objectives. In these meetings, many different stakeholders may participate, such as: representatives of Ministries, members of the Parliament, parliamentary committees, politicians, public servants, experts, representatives of affected socio-economic groups, non-governmental organizations, and - to a much lower extent - individual citizens. It should be noted that except of citizens these participant groups are familiar with constructing, expressing and supporting arguments, and also with understanding and evaluating arguments of others and responding to them. Also, usually before coming to these meetings they have already prepared arguments for supporting their views. For these reasons, participants of these two stages of the legislation process are more likely to accept an argumentation system. Above all, we expect that they will be able to use it efficiently and to a much higher extent than ordinary citizens and the general public.

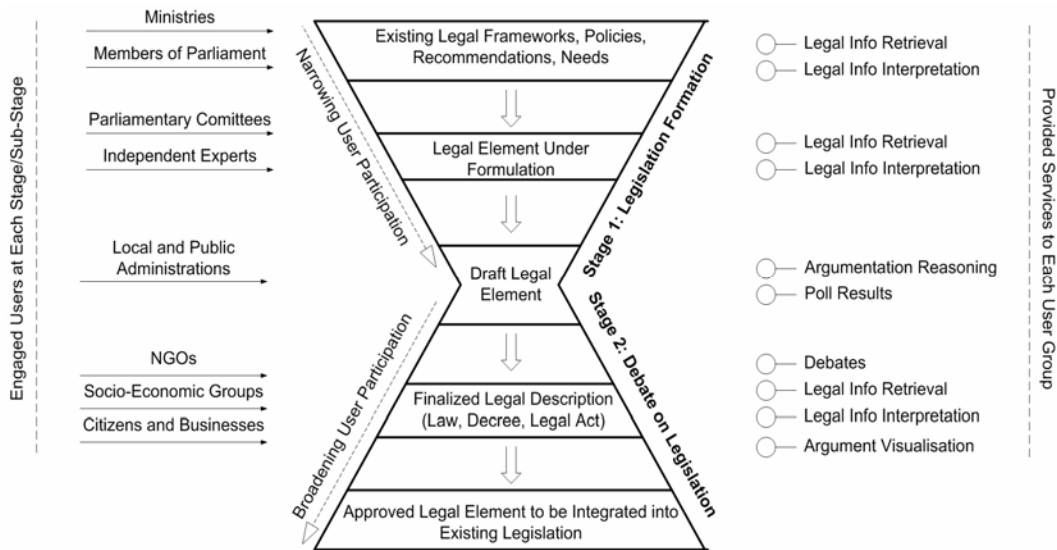


Figure 2: A basic model of the legislation proposal formation stage and the stage of debate on draft legislation

On the basis of these characteristics of the legislation proposal formation stage and the stage of debate on draft legislation, four usage scenarios for deploying argumentation systems and ontologies in an integrated LEX-IS platform are described in the following sub-sections. It should be mentioned that LEX-IS is not aiming at developing new systems. Instead, existing applications should be explored and integrated in a powerful platform to support participation in the processes of legislation drafting. Hence, the scenarios below depart from existing systems and explore their usage in the LEX-IS context of an integrated platform.

### 3.1 Providing argumentation capabilities using an existing system

The first scenario refers to offering argumentation capabilities to users via an existing argumentation system. Research on the use of appropriate information systems for supporting argumentation between individuals is quite old. It can be traced back at least to Horst Rittel's pioneering work on 'Issue-Based Information Systems' (IBIS) [10]. IBIS provide a visual map of arguments, aiming to help people collaborate for finding solutions to 'wicked problems'. 'Wicked problems' are problems that have no algorithmic, scientific or objectively optimal solutions for a variety of reasons, including the lack of consensus among stakeholders about utilities and values of the various alternatives. Public policy-making and legislation development are characterized by such problems and certainly belong to the category of 'wicked problems'. Since then, extensive research has been conducted in this area [8, 11-18], which has resulted in many argumentation systems, such as IBIS [12-13], ZENO [14], HERMES [15], PARMENIDES [16], etc. A review of existing argumentation systems is provided in [8].

It is worth mentioning the positive experience gained in a 'real-life' pilot argumentation, which we organized using the HERMES argumentation system [17-18]. HERMES enables participation in an electronic argumentation about a predefined topic by entering four basic types of discourse elements: 'Issues' (correspond to problems, decisions to be made or goals to be achieved), 'Alternatives' (i.e. potential choices) for each Issue, 'Positions' (that support or contest either one 'Alternative' or another 'Position') and 'Preferences' (which provide a qualitative means by which users can assess the relative strengths of particular Positions; a Preference consists of a tuple (Position, Relation, Position), where 'Relation' can be either 'more important than', 'of equal importance to', or 'less important than'). Based on the

discourse elements entered by the participants in an electronic argumentation, the system constructs and visualizes a discourse tree with all contributions of the participants. The pilot argumentation we organized using HERMES concerned a widely debated topic in Greece (whether or not the establishment of non-state universities should be allowed), with fourteen participants, who represented the four basic stakeholder groups: the Ministry of National Education, the University Professors, the Chambers of Industry and Commerce, and owners of existing private educational institutions interested in establishing non-state universities. In Figure 3 we can see an extract of the discourse tree developed during this argumentation.

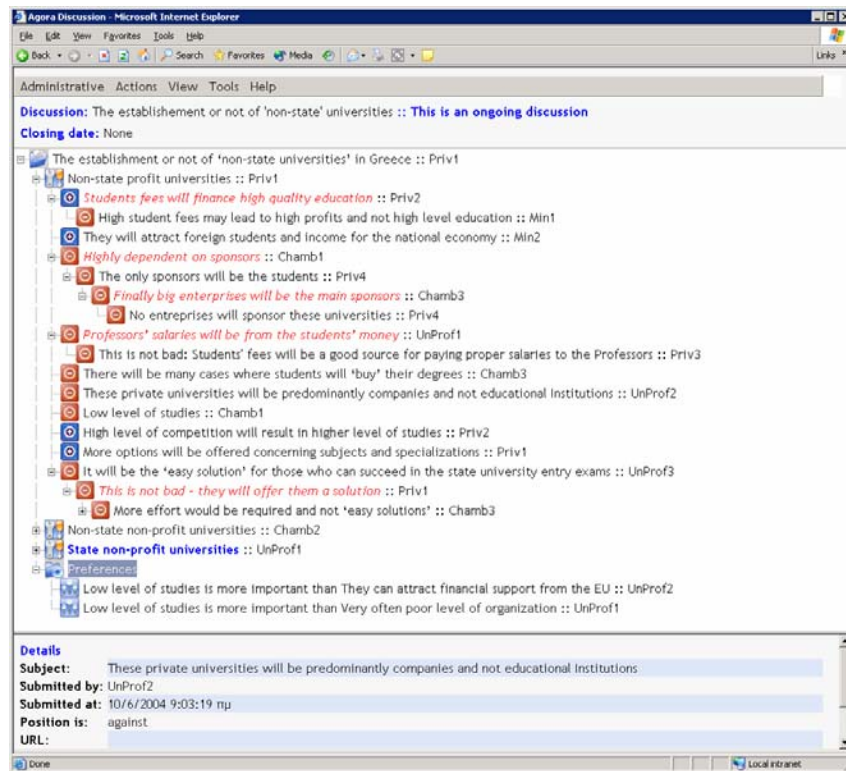


Figure 3: Discourse tree developed during an argumentation with HERMES (from [18])

From the evaluation of this pilot by the participants and the observation of the discourse elements the following conclusions have been drawn [18]: the participants felt that the system organizes the discussion effectively, stimulates creativity and discussion, and that it was easy for them to learn its basic functionality. Also there has been a high level of interaction among participants, since 63% of the discourse elements they entered were associated with another element entered by another user. However the participants also mentioned a number of problems they had: it was difficult to associate correctly a new element they intended to contribute to another existing element, to express a discussion element in a few words only and also to understand the meaning of a discussion element expressed by another participant in a few words only. Participants also felt that the electronic argumentation was quite demanding and required high level of concentration and mental effort.

Offering argumentation capabilities is a key element in LEX-IS. We will embark on an existing system, though the selection process has yet to be finalized. In any case, we will ensure that a well proven, complete, consistent and mature system concerning the types of discourse elements proposed and the proposed associations among them is chosen. In this respect, the following questions have to be clarified: Can argumentation systems cover the

semantic richness of the legislation process? Do they offer sufficient capabilities to participants to express themselves?

### **3.2 Providing argumentation capabilities using a ‘simple forum’**

Another scenario refers to offering much simpler argumentation capabilities via a simple (unstructured) forum. It allows the organization of an electronic consultation on a topic, in which each participant can enter ‘positions’ (e.g. views, opinions, etc.), can read the positions entered by others, and then can enter new positions on each of these positions (multi-thread electronic discussion). In this way, a discussion tree is gradually created in the form:

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Position1 (USER1)
  Position11 (USER8)
    Position111 (USER5)
  Position12 (USER6)
Position2 (USER3)
  Position21 (USER2)
  Position22 (USER1)
    Position221 (USER3)

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The overall advantage of this scenario is simplicity. The drawback is that, due to lack of semantic annotation of threads, such a forum does not help the participants to qualitatively structure their thoughts and relate them to each other to get a structured discussion, and it does not support the effective externalisation and management of the ‘collective knowledge’. The challenges for the LEX-IS platform are to exploit the advantages of semantically annotated threads and of argument trees, while keeping the visualisation and interaction of users with the platform simple.

### **3.3 Providing argumentation capabilities using a ‘structured forum’**

Embarking on the simplicity of online forums, yet adding a more sophisticated structuring mechanism is the aim of the third scenario presented here. ‘Structured forums’ offer to each participant the capability to enter semantically annotated discourse elements, based on a pre-defined ‘Discourse Ontology’ [19-20]. A ‘Discourse Ontology’ is defined as the set of allowed types of discourse elements, which the participants can enter, and the allowed relations among these discourse elements. For example, in an electronic argumentation in a structured forum on the problems of a particular social group, the participants may be allowed to enter only the following three kinds of positions: ‘problems’ of this social group, ‘causes’ of these problems, and ‘positions’ in agreement or disagreement with the problems and causes. An example of a ‘Discourse Ontology’ is shown in Figure 4.

Structured forums base on two key elements: the discourse ontology and the discussion tree. While the discourse ontology needs to be settled beforehand, the discussion tree will be gradually created during the argumentation in the structured forum (see Figure 5).

The basic characteristic of this scenario is that, by defining appropriate discourse ontologies of the legislation proposal formation and the debate on draft legislation, a ‘customization’ of the structured forum can be achieved. Apart from that, the semantic richness can be covered much better than in the first two scenarios. Hence in this way, better capabilities can be offered to the participants to express themselves, finally resulting in more effective and sophisticated argumentation in the participation process. This scenario also enables a more

effective externalisation and management of the ‘collective knowledge’. However, such structured forums, even though more customized to the needs of the legislation proposal formation and the debate on draft legislation, might not be characterized by the completeness, consistency and maturity of the existing argumentation systems used in the first scenario.

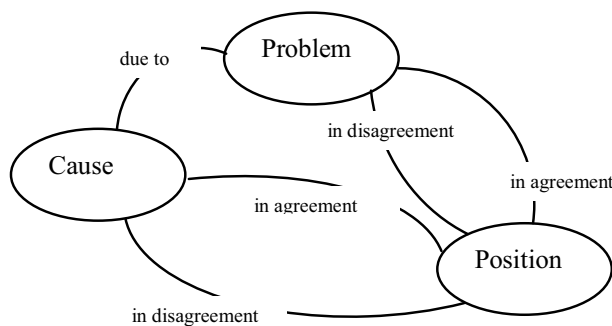


Figure 4: Discourse ontology

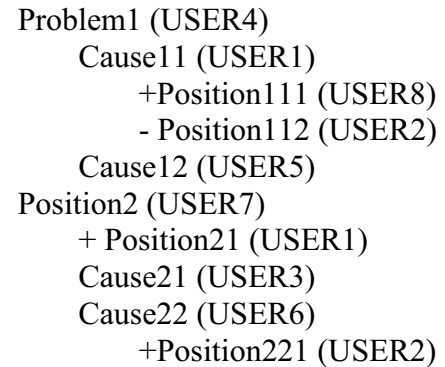


Figure 5: Discourse tree of a structured forum

Of critical importance for the success of this scenario is the design of appropriate discourse ontologies. The LEX-IS project partners will take into account relevant evidence such as minutes of consultations taken place in Parliaments in the past, interviews with experienced Parliament officials, etc. in the development of the LEX-IS integrated platform. The project team will embark on:

- existing ontologies in this domain such as introduced in [21-23]. It might be required to select appropriate parts of such existing ontologies and/or slightly modify them. Analysis of the needs and peculiarities of the chosen processes of the proposal formation and the debate on draft legislation in the agreed-upon pilot implementation sites,
- further design of the discourse ontology may be needed. Existing design ontology methods shall help to design the proper discourse ontology for LEX-IS. According to Holsapple & Joshi [24] there are five basic approaches to ontology development: inspirational (based on the viewpoint of an individual about the domain), inductive (based on the analysis of a small number of specific cases within the domain), deductive (based on some general principles about the domain), synthetic (based on synthesis from existing ontologies, with possible modifications and or expansions of them) and collaborative (based on the viewpoints of multiple individuals about the domain, possibly starting with an initial ontology produced using another approach, and then iterative improvement until consensus is reached). Among these approaches we believe that the collaborative approach can result in more acceptable and complete ontologies that incorporate many different viewpoints. However, it is also the most time-consuming and resource-intensive approach.

### 3.4 Providing arguments and legislation visualization

A precondition for sophisticated and effective participation of users in any online argumentation as presented in the above three scenarios (cf. sections 3.1 to 3.3) is to be sufficiently informed on the topic. Taking into account the complexity of modern public policy and legislation, the participants of such argumentations must usually have previously studied: i) many lengthy documents (e.g. reports, previous relevant legislation, etc.), and ii) the opinions that have been expressed in previous relevant lengthy discussions (‘traditional’

or ‘electronic’) by their participants (in an electronic discussion on public policy or legislation usually there are many thousands of postings). Acquiring the proper understanding of the topic to be discussed and decided can, hence, be quite time-consuming and difficult. For this reason, it would be beneficial to use methods and tools of Computer Supported Arguments Visualisation (CSAV) [11] for presenting the content of lengthy documents (e.g. reports, laws, etc.) and the basic issues, options and arguments expressed in previous ‘traditional’ or electronic discussions in a diagrammatic and easy to understand manner. ‘Argument visualisation’ (AV) can be defined as the representation of a body of prose or the opinions expressed in a discussion in a compact diagrammatic format, thereby using a combination of nodes of various types (shown with different symbols) and arrows connecting them. Several AV methods and tools have been developed; an extensive review is provided in [8].

Some interesting ways of exploiting AV methods and tools for supporting public policy making are proposed by Renton and Macintosh in [25], basing on experiments with the ‘Compendium’ tool<sup>7</sup>. Figure 6 demonstrates a mapping of the main arguments expressed in the debate about ‘Smoking in Public Spaces’ in Scotland using the Compendium tool.

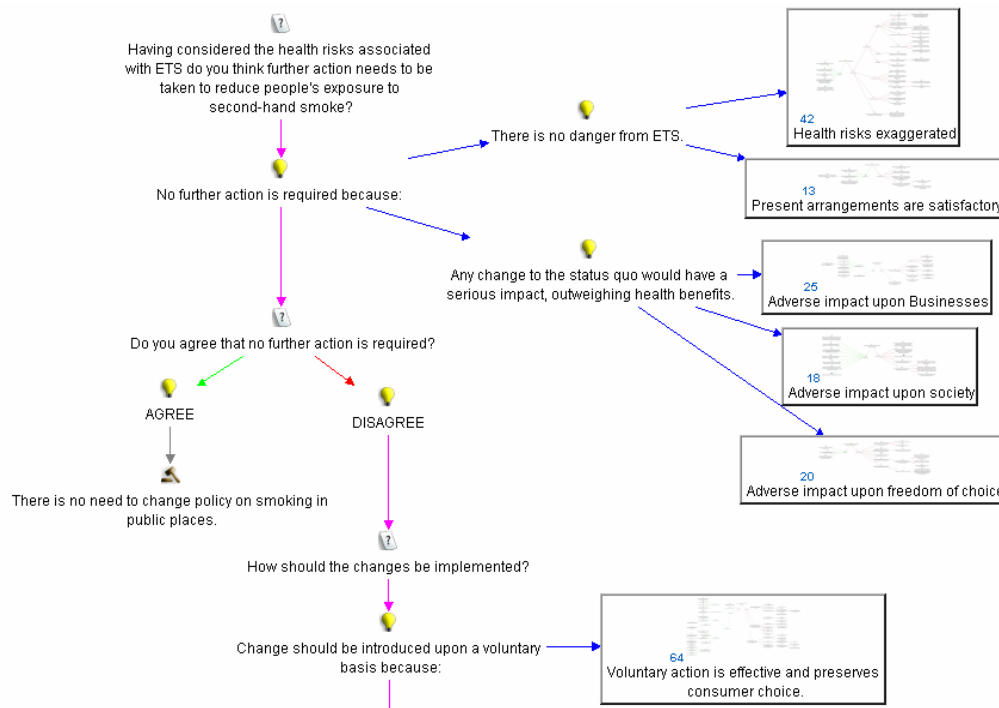


Figure 6: Argument visualisation of a debate on ‘Smoking in Public Spaces’ in the Compendium tool (from [25])

Usually in the legislation formulation stage, the existing legal framework has to be taken into account. It normally consists of several interconnected legal structures (e.g. local laws and presidential decrees, EU directives, etc.). Therefore it is useful to provide a visualisation of the existing legal frameworks, which can be based on relevant ontologies, such as the legal framework ontology proposed in [26].

LEX-IS will examine existing ontology and argument visualisation tools for the purpose to select the most powerful visualisation enabling participants in the processes of the proposal

<sup>7</sup> See <http://www.compendiuminstitute.org>



formation and the debate on draft legislation to be well prepared for the discourse stages without investigating extensive resources to read and study previously available information.

## 4 Concluding discussion

This paper investigated the potential of argumentation systems and ontologies for supporting and enhancing public participation in two highly complex and critical parts of the legislation process: in the legislation proposal formation stage and in the stage of public debate of draft legislation. The work is part of the EC-funded project LEX-IS. Four usage scenarios have been described, which discuss existing tools of argumentation systems and ontologies to support the above two stages of the legislation process. Thereby, the particular characteristics and specificities of the processes as well as existing results of relevant research have been introduced.

Summing up the discussion of the scenarios presented, a major conclusion is that the scenarios can (and should) be combined: In the first sub-stages of the legislation proposal formation, a number of unstructured argumentations with different user groups should be provided using means of simple (unstructured) fora (scenario 3.2). Free and wide exchange of opinions needs to be facilitated. In the next sub-stages of the legislation proposal formation and in the public debate of draft legislation, more structured argumentations should be supported using an existing argumentation system (scenario 3.1) or unstructured fora based on appropriate discourse ontologies (scenario 3.3). In any case, the participants of these electronic argumentations need to have effective access and possibilities to comprehend the available information on the topic to be discussed in a visualised form. A proper visualisation of the existing legal framework and of the basic arguments expressed in relevant documents (e.g. reports) and previous relevant discussions ('traditional or electronic') needs to be implemented (see scenario 3.4).

The next activity of LEX-IS is to refine the requirements for the integrated platform and for the use of argumentation systems and ontologies. On this basis, the design and pilot implementation of the LEX-IS platform will be performed, which will subsequently be evaluated in four pilot evaluations. The scientific analysis should further on elicit sound conclusions (based on 'real-life' usage) on the feasibility, usefulness, acceptance and value of electronic argumentation support and discourse ontologies in the context of the procedures of public policy proposal formation and the debate on draft legislation.

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