

# Carneades User Manual

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# 1 Getting Started

The Carneades argumentation system is open source software, freely available for downloading at <http://carneades.github.com>.

Carneades provides web-based, collaborative software tools for:

- summarizing the arguments of a debate in an *argument graph*
- visualizing, browsing and navigating argument graphs
- critically evaluating arguments
- forming opinions, participating in polls and ranking stakeholders by the degree to which they share your views
- obtaining clear explanations, using argument graphs, of the different effects of alternative policies in particular cases

In this manual, we distinguish three kinds of users:

**Public Users** Users interested in understanding arguments and policies, whom we assume have had *no specialist training* in argumentation or policy modeling.

**Analysts** Users who have had *specialist training* in argumentation or rule-based policy modeling.

**System Administrators** Users with sufficient computer skills to install, configure and administer the Carneades software.

These are only roles. Some people may be able to use the system in more than one of these roles. In particular, we aim to make the software simple to install and administer, so that ultimately anyone with basic computer skills will be able to serve as “system administrator”.

The rest of this manual is organized in the following chapters:

- The Carneades Home Page
- Argument Graphs
- Browsing, Visualizing and Evaluating Arguments
- Forming, Polling and Comparing Opinions
- Analyzing and Comparing Policies
- Editing Argument Graphs
- Modeling Policies and Argumentation Schemes
- System Administration
- Application Scenarios

The first two of these chapters, about the Carneades home page and argument graphs, are recommended to be read first by all users. The home page chapter explains how to access and navigate among the various tools provided by the system. The argument graph chapter provides a concise overview of the underlying data model used by all the tools. The next three chapters are for public users and explain how to use the tools for argument browsing, opinion polls and policy analysis, respectively. The chapters on editing argument graphs and modeling policies are for analysts with some prior knowledge of argument reconstruction methods and rule-based systems. The system administration chapter is recommended reading for anyone wishing to install, configure and administer the Carneades software. Finally, the chapter on application scenarios may be of interest to managers and public administrators looking for ways to improve the quality of decision-making processes in their organizations.

## 2 The Carneades Home Page

The Carneades home page provides an overview of the features and tools of the system along with the main menu for accessing these tools. The main menu is always available, on every page of the Carneades system, to make it easy to navigate directly from one tool to another at any time.

The items in the main menu are:

- Home
- Argument Graph
- Poll
- Policy Analysis
- System Administration

The “Home” menu item takes you back the home page, described here.

The “Argument Graph” menu item takes you a description of the debate and a hypertext outline of the argument graph model of the debate. The argument graph page includes a submenu of commands for generating argument maps, evaluating arguments, viewing argumentation schemes, exporting argument maps to XML and, if you are logged in as an analyst, for editing the argument graph.

The “Poll” menu item takes you to the opinion formation, polling and comparison tool, where you can moderate a virtual debate of the issues. In return, you will receive a guided tour of the issues and arguments, to help you to formulate your own opinion. The tool also provides you with a way anonymously share

your opinion with other users. The polling results are aggregated by the system and used to help you to evaluate the acceptability of claims. Finally, the tool compares your opinions with the opinions expressed in the published documents used to create the argument graph, for example the opinions of political parties, and ranks the authors by the degree to which their opinions agree with yours.

The “Policy Analysis” menu item takes you to a tool for analyzing and comparing the effects of various policy proposals on example cases. In a dialog with the system, you will be asked a series of questions to gather information about a real or hypothetical case. An argument graph will be generated, by applying the rules of the policy proposals to the facts of the case, showing how the various policies would work in the given case. The tool can help you to find the policies which best serve your interests. Here too your privacy is protected. Care is taken to not request or store information that could be used to reveal your identity.

Finally, the “System Administration” menu item takes you to a page for managing and configuring the Carneades server. You will need to log in with a user name and password. Here you can create, edit, archive and delete projects, where each project consists of an argument graph, a set of argumentation schemes, models of proposed policies, the test cases and possibly local copies of source documents.

The current project, the one being accessed and used from the user interface, is identified by a parameter in the Web address (URL) used to access the system. Only system administrators have access to the list of all projects served by a particular installation of the Carneades system.

### 3 Argument Graphs

Argument graphs model relationships among arguments, statements and source documents. To build the model, source documents need to be interpreted to find the arguments, in a process called “argument reconstruction”.

Consider the following simple legal argument: Johnny violated the law by riding his skateboard in the park.

This same argument can be expressed in many different ways. Here are some examples:

1. Because Johnny rode his skateboard in the park he violated the law.
2. Vehicles are prohibited in the park. Someone who does something which is prohibited violates the law. Johnny rode his skateboard in the park. A skateboard is a vehicle. Therefore Johnny violated the law.
3. Johnny hat gegen das Gesetz verstoßen, weil er sein Skateboard im Park benutzt hat.

The first example just reordered the premise and the conclusion of the argument, putting the premise first. The second example reveals some implicit premises of the original formulation of the argument. The third example is a German translation of the original formulation of the argument.

All four of these texts, including the original formulation, express the *same* argument, but in different ways. In a large-scale debate, for example about European policy issues, the same argument might be expressed in *thousands* of different ways in many different languages. (The European Union has 23 official languages.)

One of the purposes of argument graphs is to provide a way to summarize complex debates with exactly one node in the graph for each argument put forward in the debate. A single argument graph is used to represent all the arguments put forward in a debate, from all participants. The nodes can quote one or more source documents, and include links to these source documents, so no information need be lost and all voices can still be heard, inclusively. Grouping the different formulations of an argument together into a single node in the graph, abstracting away details, makes it possible to quickly obtain an overview of the arguments and to obtain a clearer picture of relationships among arguments. A hypertext or map of the source documents directly, without an argument graph, would make it difficult to “see the forest for the trees”.

### 3.1 Data Model

The entity-relationship diagram above shows the elements of argument graphs and their connections. (The figure does not visualize a particular argument graph, but rather relationships between the elements of argument graphs in general.)

The two main elements of argument graphs are statements and arguments. Statements represent propositions, claims and assertions. Arguments represent simple inferences from one or more premises to a single conclusion. Again, there should be only one statement or argument in the graph for each statement and argument in the source documents, no matter how many different ways the statement or argument has been expressed in source documents. Some or all formulations of the statement or argument can be quoted or referenced in the metadata of the statement or argument node. See the discussion of metadata below for further information.

As can be seen in the entity-relationship diagram, arguments are linked to statements in two ways in argument graphs. Each argument has exactly one conclusion, which is a statement, and zero or more premises, where each premise has exactly one statement node. A statement may be the conclusion or premise of more than one argument.

A statement may be both a conclusion and a premise, resulting in complex argument graphs, representing chains or trees of reasoning. Argument graphs may

contain cycles. A simple cycle would result if a statement and a premise of the same argument. There are methods for resolving these cycles when evaluating argument graphs.

A statement in an argument graph represents both a proposition and the negation of the proposition. To continue with our example, the sentences “Johnny rode his skateboard in the park” and “Johnny did not ride his skateboard in the park” would be represented by a single statement in an argument graph. Conclusions and premises of argument can be negated using con arguments and negative premises, respectively. That is, there are two kinds of arguments, pro and con. An argument is pro if its conclusion claims the statement is true and con if it claims the statement is false. Similarly, there are two kinds of premises, positive and negative. A positive premise holds if its statement is presumably true (“in”). Conversely, a negative premise holds only if its statement is presumably false (“out”).

Prior models of argument graphs do not distinguish pro and con arguments or positive and negative premises. Rather, in these prior approaches all argument nodes are pro and all premises are positive. Our approach has the advantage of reducing the number of statements up to 50%, resulting in more compact summaries of the arguments.

### 3.2 Statement Properties

**id** A Uniform Resource Name (URN) serving as a unique identifier for the statement, world-wide.

**text** A concise formulation of the statement, written by the analyst who reconstructed the arguments from the source documents. Paraphrases the various formulations of the statement in the sources. Compare with the “description” property of the metadata of the statement, which can be used to quote some or all of the formulations of the statement in the sources and provide translations in several languages.

**weight** A real number in range of 0.0-1.0 representing the degree to which the statement is accepted as true by the users, where 0.0 means the statement is *rejected* (believed to be false by the users) and 1.0 means the statement is *accepted* (believed to be true). This information is collected via polls.

**proof standard** The method used to combine pro and con arguments. Several proof standards are supported by the system. For most purposes, the “preponderance of the evidence” standard should suffice.

**value** A real number in the range 0.0-1.0, storing the output of the argument evaluation process, where 0.0 means the statement is *out* (presumably false), 1.0 means the statement is *in* (presumably true) and all other values mean the arguments are insufficient for making any presumptions about the truth or falsity of the statement.

**atom** An optional formal representation of the statement in predicate logic.  
(This feature is for analysts and need not interest public users.)

**main** A Boolean value (true or false) used to indicate whether the statement is one of the main issues of the debate modeled by the argument graph.

### 3.3 Argument Properties

**id** A Uniform Resource Name (URN) serving as a unique identifier for the argument, world-wide.

**direction** Pro or con.

**strict** A Boolean value (true or false) expressing whether the conclusion of the argument is necessarily true when its premises are true (strict arguments) or only presumably true. Nonstrict arguments are called “defeasible” arguments.

**scheme** The name of the argumentation scheme applied, if any. Optional. Examples: “argument from credible source”, “argument from practical reasoning”.

**weight** A real number in range of 0.0-1.0, representing the relative weight of the argument, compared to other arguments pro and con the conclusion of the argument. This information is collected via polls.

**value** A real number in in the range 0.0-1.0, used to record the output of the argument evaluation process, where 0.0 means the argument is *out* (not acceptable), 1.0 means the statement is *in* (acceptable) and all other values mean the arguments in the graph, taken together, are insufficient for determining the acceptability of this argument.

### 3.4 Premise Properties

**polarity** Positive or negative.

**role** The role of the premise in the argumentation scheme applied. Examples: “minor”, “major”.

**implicit** A Boolean value (true or false). Can be used to note that the premise was not explicit in the source documents from which the argument node was reconstructed.



### 3.5 Metadata

The argument graph as a whole, as well as each of its statements and arguments, can be annotated with metadata, using the [Dublin Core](#). There are 15 elements in the Dublin Core. Each element may have zero or more values. Here is a list of the Dublin Core elements:

1. Title
2. Creator
3. Subject
4. Description
5. Publisher
6. Contributor
7. Date
8. Type
9. Format
10. Identifier
11. Source
12. Language
13. Relation
14. Coverage
15. Rights

See [Dublin Core](#) for a detailed description and usage guidelines for each element. The Dublin Core is intended to be useful for describing a wide range of “resources” on the World-Wide Web. Not all of the elements may be applicable for argument graphs.

In addition, Carneades allows each metadata record to be assigned an optional “key”, a string which can be used as a label to refer to the metadata record, such as “BenchCapon:2008”, similar to the way citation keys are used in bibliographic databases such as BibTeX.<sup>1</sup> At most one key should be provided.

Carneades provides special support for providing description elements of the Dublin Core in multiple languages (English, German, French, ...) and for formatting these descriptions using the [Markdown](#) language. This feature can be used to include quotations from and links to source documents in the descriptions of both statements and arguments.

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<sup>1</sup>

## 4 Browsing, Visualizing and Evaluating Arguments

This chapter of the Carneades user manual explains how to:

- Access the argument graph page for viewing and editing argument graphs on the World-Wide Web.
- Use hypertext in web pages to browse an argument graph.
- Visualizing argument graphs in diagrams, called “argument maps”, and using these maps to navigate to more detailed views of statements and arguments.
- Evaluate arguments to reveal missing premises, check the form of arguments, ask critical questions and assess the acceptability of statements.
- Export an argument graph to XML, to archive the graph or process it using other software.
- Generate outlines of the arguments in a graph, for further editing using text editors or word processors.

### 4.1 The Argument Graph Page

The user interface of Carneades is a web application. You access the pages and views of the user interface with web addresses, called Uniform Resource Locators (URL), just like you access any resource on the World-Wide Web. Most of the time you will access the application by clicking on a link embedded in some page on the Web, for example in a news article, blog entry or e-participation web site. If you are using Carneades as a stand-alone, desktop application, these URLs will be local addresses, from the “localhost” domain, pointing to web pages served by the application on your personal computer.

An argument graph page consists of the following parts:

- The *title* of the argument graph. This title usually includes the topic of the discussion or debate.
- A *menu bar* of commands. The commands shown depend on the role of the user. Public users, who need not login to the system, are shown the commands “export” and “map”, for exporting the argument graph to XML and viewing an argument map visualization of the graph, respectively. Analysts, who must login to the system with a password, are also shown “new statement” and “new argument” commands. Only analysts may modify the argument graph.

## Reconstruction of Comments on the EU Green Paper “Copyright in the Knowledge Economy”

[Export](#) [Evaluate](#) [Map](#) [New Statement](#) [New Argument](#)

IMPACT Project. 2011. Reconstruction of Comments on the EU Green Paper “Copyright in the Knowledge Economy” .

### Description

The purpose of the [Green Paper](#) on “Copyright in the Knowledge Economy” is to “foster a debate on how knowledge for research, science and education can best be disseminated in the online environment.” [ @GreenPaper, p. 3].

The Green Paper has two parts. The first deals with general issues and the second deals with “specific issues related to the exceptions and limitations which are most relevant for the dissemination of knowledge and whether these exceptions should evolve in the era of digital dissemination.” [ @GreenPaper, p. 3].

Here, we present a reconstruction of some of the policies and arguments put forward in the comments submitted in response to the Green Paper. Our aim is not to comprehensively model all the policies and arguments submitted, but rather to model a sufficient number of representative arguments and policies for the purpose of illustrating features of the IMPACT argument toolbox.

The Corpus Selection Working Group of the IMPACT project has chosen 4 of the 25 questions raised in the Green Paper, as well as 12 of the 323 comments submitted, representing a wide range of stakeholders, to be used for the research and development purposes of the project.

The four questions covered by this model are listed below. Click on a question for further information.

### Main Issues

- 1 ☐ Q24. Should there be more precise rules regarding what acts end users can or cannot do when making use of materials protected by copyright?
- 2 ☐ Q9. Should the law be clarified with respect to whether the scanning of works held in libraries for the purpose of making their content searchable on the Internet goes beyond the scope of current exceptions to copyright?

Figure 1: An Argument Graph Page

- A *description* of the topic of the discussion modeled in the argument graph. The description may be available in several languages. The user interface provides a way to select and change your preferred language during the session (*not yet implemented*). The description can be arbitrarily long and include multiple sections, paragraphs, images, hyperlinks, lists and other content.
- A list of the *main issues* of the discussion. Each item in the list is linked to a page providing detailed information about the statement in the argument graph at issue.
- An *outline* of the top five levels of the arguments in the argument graph. The first level of the outline lists the main issues (again). The second level lists the arguments pro and con each issue. The third level lists the premises of each of these arguments. The fourth level lists the argument pro and con each premise. Finally, the fifth level lists the premises of these arguments. Deeper levels of the argument graph can be navigated to by first clicking on a statement or argument in the outline and then following the links on the next page. Since argument graphs may contain cycles and are not restricted to trees, some items may appear multiple times in the outline.
- A list of *references* to the source documents used to construct the argument graph. For documents available on the Web, the reference will include a hyperlink to the source document.

## 4.2 Using Hypertext to Browse an Argument Graph

There is a web page for each statement and argument in the argument graph providing detailed information about the element along with links to related statements and arguments in the graph. You can use these pages to navigate from node to node in the argument graph, by simply clicking on the links in the usual way. To go back to previous pages, use the back button of your web browser.

### 4.2.1 Statement Pages

The top of the statement page displays the properties of the statement: its id, atom, whether or not it is a main issue, its proof standard, usually “pe” (preponderance of the evidence), its weight and value. The other proof standards available are “dv” (dialectical validity), “cce” (clear and convincing evidence), and “brd” (beyond reasonable doubt). See the section on Evaluating Arguments for further details about proof standards.

## Statement

Export
Evaluate
Map

Edit
Delete
New Argument

id	urn:uuid:6d4ab5c5-1511-42a5-a3c2-f017d2c1db2d
atom	
main issue	false
standard	pe
weight	
value	0.5

### Text

Yes. The exceptions should be clarified to allow works held in libraries to be scanned for the purpose of making their content searchable on the Internet.

### Pro Arguments

- Argument #1
  - Circumstances ☐ Not all the material digitised by publishers is scanned with OCR (Optical Character Recognition) with the purpose of making the resulting content searchable.
  - Action ☐ Clarifying the law to allow works held in libraries for the purpose of making the resulting content searchable on the Internet would have a transformative effect on research, learning and teaching.
  - Goal ☐ Realizing a transformative effect on research, learning and teaching is an important social goal.

### Con Arguments

- Argument #1
  - ☐ If the rules regulating the scanning of works held in libraries were unclear, this would be known.
  - ☐ It is not known that the rules regulating the scanning of works in libraries are unclear.

### Premise of

- Argument #1

Figure 2: A Statement Page

The next section displays the *text* of the statement. This formulation of the statement is written by the analyst or analysts who reconstructed the arguments to build the argument graph.

If metadata had been provided for the statement, it would be displayed next. Descriptions may be entered, by analysts, in multiple languages. The description, if available, will be displayed using the language chosen by the user. If no description has been entered manually by analysts for the selected language of the user but a description is available in some other language, a translation service will be used to generate a description in the selected language (*not yet implemented*).

Finally, the statement pages lists pro and con arguments about the statement, i.e. arguments having this statement, or its negation, as a conclusion, as well as arguments which have this statement, or its negation, as a premise. The premises of the pro and con arguments are also listed. This makes it possible to navigate to nearby arguments and statements in the argument graph, by simply clicking on the links in these lists. Use the back button of your web browser to return to this statement page.

#### 4.2.2 Argument Pages

Argument pages are quite similar to statement pages. The top of an argument page displays the properties of the argument: its id, the argumentation scheme applied (if any), whether it is a strict or defeasible argument, its weight and value. The argumentation scheme contains a hyperlink (*not yet implemented*). Click on the link to view a description of the scheme.

If metadata had been provided for the argument, it would be displayed next. Descriptions can include quotations of one or more source texts expressing the argument, along with hyperlinks to the sources on the Web. The description, if available, will be displayed using the language chosen by the user. If no description has been entered manually by analysts for the selected language of the user but a description is available in some other language, a translation service will be used to generate a description in the selected language (*not yet implemented*).

Next, the premises of the argument are listed. If available, the role of each premise in the argumentation scheme applied is shown (e.g. “major” or “minor”). The check boxes to the left of each premise are used to indicate whether the statement is current *in* (checked box, meaning presumably true), *out* (crossed out box, meaning presumably false) or neither (empty box, not enough information to presume either truth or falsity), given the arguments in the graph and the opinions of users from polls about the acceptability of statements and relative weights of pro and con arguments.

After the premises, the conclusion of the argument is shown, preceded by “pro” or “con”, showing the direction of the argument, and a check box showing the

## Argument

[Export](#) [Evaluate](#) [Map](#) [Edit](#) [Delete](#)

id urn:uuid:4294d969-94c3-4d09-b663-12d4b4d214e7  
scheme  
strict false  
weight 0.5  
value 0

### Premises

- Goal ☐ Performing the action of harmonizing the exceptions and giving precedence to community law over contracts would achieve a state in which it easier for researchers and students to work in more than one Member State.
- Action ☒ Harmonizing the copyright exceptions would make it easier for researchers and students to work in more than one Member State.
- Values Promoted ☐ Achieving the goal of making it easier for researchers and students to work in more than one Member State would promote the values of efficiency, legal certainty, scientific research and education.
- Circumstances ☐ In the circumstances: Researchers and students increasingly work in more than one Member State. The patchy availability of exceptions makes their work difficult, because what is lawful in one country is probably unlawful in another. The situation is made worse by the provision of most Member States that contracts, governing the use of digital material, automatically overrides statute law.

### Conclusion

pro ☐ The permitted exceptions should be harmonised so that they are available in all Member States.

### Counterarguments

- Argument #1
  - Goal ☐ It is essential that the basic principle of freedom of contract be recognized and preserved by any copyright legislation.
  - Action ☐ Harmonizing copyright exceptions would impair the freedom of contract.
  - Values Demoted ☐ Impairing the freedom of contract would demote the values of innovation and the dissemination of knowledge and information.
  - Circumstances ☐ Currently, the lack of harmonization of copyright exceptions facilitates the freedom of contract.
- Argument #1
  - ☐ There are better ways to promote efficiency, legal certainty, research and education than making it easier for researchers and students to work in more than one Member State.

Figure 3: An Argument Page

acceptability of the conclusion, as for the premises.

Finally, a list of counterarguments is shown.<sup>2</sup> The premises of the counterarguments arguments are also listed. This makes it possible to navigate to nearby arguments and statements in the argument graph, by simply clicking on the links in these lists. You can use the back button of your web browser to return to this argument page.

### 4.3 Visualizing Argument Graphs in Argument Maps

The menus of the argument graph page, statement pages and argument maps include a “map” button. Clicking on the “map” button generates a diagram, called an “argument map”, which visualizes the argument graph as a network (directed graph) of statement nodes and argument nodes connected by links. Statement nodes are shown as boxes; argument nodes with circles and boxes with rounded corners.

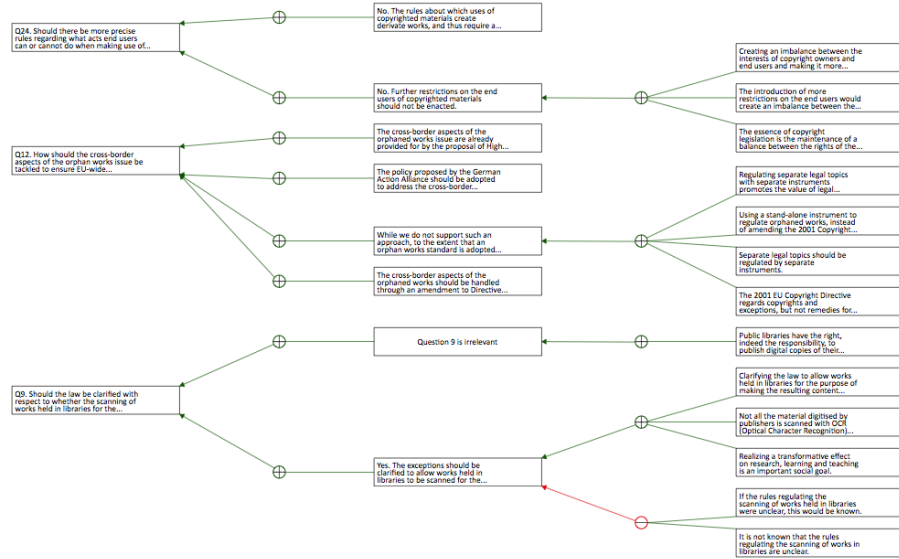


Figure 4: An Argument Map

For statement nodes, the text of the statement is shown inside the box, possibly truncated if the text is too long. In argument nodes, the circle is filled

<sup>2</sup>By counterarguments here we mean *rebuttals* (arguments with the opposite conclusion) and *undercutters* (arguments which deny the applicability of this argument). Arguments which attack a premise of this argument (“undermining” arguments), are not listed. To navigate to undermining arguments, click on the premise of the argument of interest. The undermining arguments will be listed on its statement page.



with a plus sign, if the argument is a pro argument, or a minus sign, for con arguments. The edges (links) between argument nodes and statement nodes show the premises and conclusion of the argument. The conclusion of the argument is the statement node pointed to by the edge with the normal arrowhead. The other statement nodes linked to the argument, without arrowheads, are its premises. Negative premises are displayed with a circular (dot) arrowhead on the statement side of the edge.

The statement and argument nodes in argument maps contain hyperlinks. Clicking on a statement or argument node displays the details of the node in a statement or argument page, respectively.

In argument maps, argument nodes whose conclusion is another argument node, rather than a statement node, visualize “undercutting” arguments. These are arguments which question the applicability of another argument. This is the only case where two nodes of the same time are directly connected in the map.

Argument maps are represented using structured vector graphics (SVG) not bitmaps. You can zoom the map in or out, to any scale, without loss of resolution. How this zooming is done depends on your device and web browser.

When argument graphs have been evaluated, the status of the argument and statement nodes is visualized in argument maps using both color and icons. Nodes which are “in” are filled with a green background and contain a checked box. Nodes which are “out” are shown with a red background and contain a crossed box (a box filled with an X). Nodes which are neither in nor out are filled with white background color and contain an empty checkbox. The colors are redundant to accommodate black and white printing and color-blind users.

Argument graphs may contain cycles. However, currently the algorithm used to layout the argument and statement nodes in the map is not able to handle cycles. *This limitation will be removed in a later version of the system.*

Argument graphs can be very large. Currently the *entire* argument graph is displayed in the argument maps. In the future only a partial view of the argument graph in maps will be shown, at least for larger graphs. The part of the graph shown will depend on the context. The map generated from the argument graph page of the argument graph will show the arguments and statements near the main issues of the map. The maps generated from statement and argument pages will show the part of the argument graph near the selected statement or argument. A method for scrolling the maps, to bring other parts of the graph into view, will be provided.

## 4.4 Searching for Arguments

The argument graph page will provide access to a command for searching for arguments.

**Not yet implemented**

## 4.5 Evaluating Arguments

By argument “evaluation” we mean the process of critically assessing arguments by

- revealing implicit premises
- validating whether the arguments are formally correct, by instantiating accepted argumentation schemes
- asking appropriate critical questions, depending on the schemes applied
- and determining which claims are acceptable, taking into consideration the assumptions of the users and their collective assessment of the relative weights of conflicting pro and con arguments.

The first three of these tasks can be accomplished by comparing the argument with its argumentation scheme. On the argument page, click on the argumentation scheme to view a description of the scheme (*not yet implemented*). Most web browsers provide some way to open the link in a new tab, so that you can easily switch back and forth between the argument page and the description of the scheme. Now you can check whether any of the premises listed in the scheme are missing from the argument. The argument is formally valid if all the premises of the scheme are explicitly provided by matching premises of the argument and the conclusion of the argument matches the conclusion of the scheme.

Argumentation schemes define exceptions and assumptions which can be used to ask critical questions. The exceptions provide reasons for not applying the argument, undercutting it. If an exception is true, this doesn’t mean that the conclusion of the argument is false, but only that the argument does not provide a good reason to presume the conclusion to be true. The assumptions of the scheme are implicit premises which need to be proven only if they are called into question. So, if you think an assumption does not hold, you should consider making an issue of it using whatever channels are available for you for participating in the discussion. (The Carneades system does not provide this service. Its function is to provide a tool for summarising and understanding arguments, wherever they take place.)

The assumptions of the users and their collective assessment of the relative weights of conflicting pro and con arguments are collected and aggregated using the opinion polling tool described in the opinion polling chapter of this manual. At any time, an analyst can execute the “evaluate” command, shown in the menu bars of the argument graph page, and the statement and argument pages, to compute the acceptability of the arguments and statements in the argument graph, on the basis of the information gathered from users via the polls. A statement is considered acceptable if it is *presumably true* given only

the arguments modelled in the argument graph and their own assumptions and assessment of the relative weights of these arguments.<sup>3</sup>

If you do not agree with the result of the evaluation, there are at least three reasons why you may be right and the system’s evaluation wrong:

1. Not all relevant arguments have been included in the model, or put forward in the debate. If you are aware of some missing argument, consider contributing it to the discussion yourself.
2. The collective, averaged opinion of the users who participated in the poll may be incorrect. Minority views can be correct. If you haven’t yet participated in the poll, you may want to do so now.
3. The formal model of argument we are using to compute acceptability, based on the state of the art of the field of computational models of argument, may be incorrect. Of course, specialist knowledge is required to assess the correctness of the model. If you, like most people, do not have this knowledge, then we recommend a skeptical but respectful attitude. If you agree with the results of the model, then the model gives you a reason to have more confidence in your opinion. If you do not agree with the results of the model, then you may want to take pause to reconsider your views, even if in the end you do not change your mind.

## 4.6 Exporting Argument Graphs to XML

The menu bar of the argument graph page and the statement and argument pages includes an “export” button. Click on this button to generate an XML file containing all the data and metadata in the argument graph, including quotations of and links to source documents.

The XML files use a schema called the “Carneades Argument Format” (CAF), documented elsewhere. *To do: write the CAF documentation*

These XML files can be used to transfer argument graphs from one installation of the Carneades system to another, to merge argument graphs from several sources, to archive argument graphs, or to translate argument graphs into other formats, such as the [Argument Interchange Format](#) (AIF), or the generate reports or other kinds of visualisations..

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<sup>3</sup>A state-of-the-art computational model of argument is used to compute the acceptability of statements. This model maps argument graphs to a so-called “Dung abstract argumentation framework” (Dung 1995), using a method based on the ASPIC+ model of structured argument (Prakken 2010), but adapted to preserve the features of the Carneades model of argument graphs [GordonPrakkenWalton:2007]. This ASPIC+ version of Carneades can handle cyclic argument graphs, removing the main limitation of the original version of Carneades. Several semantics are available for Dung Abstract Argumentation Frameworks. Carneades uses grounded semantics, which is the most cautious (skeptical) about accepting claims.

## 4.7 Generating Outlines

Not yet implemented

## 5 Formulating, Polling and Comparing Opinions

The opinion formation and polling tool of the Carneades system serves two purposes:

- It guides you step by step through the arguments on all sides of a complex policy debate, in a kind of simulated debate, providing you with an overview of the issues, positions and arguments in a systematic way. The tool can help you to form your own opinion, if you don't yet have one, or to critically evaluate and reconsider your current opinion, if you do. The tool also enables you to compare your responses with the published positions of some stakeholders, such as political parties, helping you to find persons and organizations which best represent or share your views and interests.
- At the same time the tool conducts a poll to collect your views and opinions on the issues, taking care to protect your privacy. You will not be asked or required to enter any personal data, such as your name or email address, which could be used to identify you or associate your answers to poll questions. The anonymous and aggregated results of the survey can provide valuable feedback to you as well as policy makers, going beyond the information provided by traditional surveys. It enables users to discover not only how much support policies enjoy, but also to learn precisely why particular aspects of the policies, or their underlying assumptions, are supported or not.

### 5.1 Accessing the Opinion Formation and Polling Tool

Every page of the Carneades system includes the main menu. Click on the “poll” button of the main menu to access the opinion formation and polling tool.

The first page of the opinion formation and polling tool provides an overview of the features of the tool and explains the following procedure for using the tool:

1. Log in using a pseudonym to protect your privacy. You can login again using this name to change your responses at any time. Choose a cryptic name, like a secure password, to make it difficult for others to access or change your answers.

2. Read an introduction to the topic of the debate and select an issue of interest.
3. Answer a series of survey multiple-choice questions about the selected issue, asking you whether you agree or disagree with claims made in arguments. To help you to formulate or reconsider your opinion, you have the option to first view quotations of formulations of the arguments from the source documents. No information about the authors of the quotations will be shown during this phase, to allow the arguments to speak for themselves and avoid prejudicing your answers. (The authors will be revealed at the end, when comparing your opinions to theirs.) The system will inform you about your progress and estimate the remaining number of questions. The precise number of questions may vary, as the order and number of questions depends on your answers to prior questions. You decide how deep to delve into the issues and can control how much time to spend answering poll questions.
4. View a summary of the questions and your responses. You are provided with an opportunity to change your answers.
5. Compare your opinions with those of the authors of the source documents used to create the argument graph. Rank the authors of the source documents, such as political parties, by how much they agree or disagree with your opinions. You can click on the titles of the source documents to download and view their full text and check for yourself the extent to which you agree or disagree with the claims made.

This procedure is flexible and you are in control. You are the moderator of the virtual debate. You can stop at any time, and continue later if you'd like, or jump backwards or forwards to any step in the procedure.

## 5.2 Question Types

Two types of questions are asked during the poll. The questions are generated automatically by traversing, in a systematic way<sup>4</sup>, the nodes of the argument graph. The first time you are asked for your opinion about some statement, you will be asked whether you

- agree with the statement
- disagree with the statement
- want to first see the arguments pro and con the statement before expressing an opinion, or finally

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<sup>4</sup>Depth-first.

- want to skip this issue and go on the next.

If you first want to see the arguments before answering, and thus choose the third alternative, then the question will be put aside. After you have seen the arguments, to the depth and level of detail you choose, you will be asked again for your opinion of the statement. This second time, however, the question is formulated somewhat differently. You will first be asked to weigh the arguments pro and con the statement which you have agreed are good arguments, that is arguments whose premises, in your opinion, are true. You can easily adjust the relative weights of these arguments, using sliders, as shown in the figure.

After you have weighed the arguments, on the same page, you will be asked whether you

- agree with the statement
- disagree with the statement, or
- want to skip this issue and not express an opinion

Please be careful to take your own assessment of the relative weights of the pro and arguments into consideration when answering the question, remembering that these are all arguments you agree with, even if they happen to conflict. Weigh the arguments to resolve the conflict and justify or explain your opinion.

### 5.3 Checking and Changing Your Answers

To check or change your answers go to the “summary” page, by clicking on the “summary” menu item of the menu bar.

The summary page lists all the statements with which you have agreed or disagreed, showing your opinion.<sup>5</sup> To change your opinion about some statement, click on the “change” button next to the statement. This will take you to a page summarizing the pro and con arguments you agree with about the statement and giving you an opportunity to adjust the weights of these arguments and change your opinion of the statement. Try to take care to make sure that your new opinion remains consistent with the relative weights you assign to the pro and con arguments.

After you have changed your opinion, or cancelled the dialog, you will be returned to the summary page, where you can continue checking your other answers.

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<sup>5</sup>The statements you skipped, without expressing an opinion are not listed. *Not yet implemented: some way for the user to review and answer the skipped questions, including taking a tour of the arguments about the skipped questions.*

## 5.4 Comparing Your Opinions with Others

To compare your opinions with those expressed in the source documents used by the analysts to build the argument graph, click on the “compare” button in the menu bar of the opinion formation and polling tool. This will take you to a page showing how much you agree or disagree with the opinions expressed in these documents. The documents are grouped into five categories:

- Very Much in Common
- Much in Common
- Some in Common
- Little in Common
- Very Little in Common

In each category, full references to the documents are provided (author, title, etc). The title includes a hyperlink to the source of the document on the Web. You can click on the title to download and read the original document, to judge for yourself how much you agree or disagree with the opinions expressed in the document.

The rest of this section explains briefly how the comparison is computed.

All of the arguments modeled in the argument graph are tagged with the keys of source documents in which the argument has been made, from the corpus of source documents used by the analysts to construct the graph.<sup>6</sup> These documents do not merely cite or quote the argument. They express agreement with the argument, by claiming that the premises and the conclusion of the argument are true. Since the arguments are linked to their conclusion and premises in the argument graph, it is easy to compute from the source metadata of arguments the set of claims, i.e. statements claimed to be true or false, in each source document. These claims are then compared to your opinions, based on your answers to the poll questions.<sup>^</sup>[The similarity of opinions is calculated using the “Euclidean distance” metric (Segaran 2007, 9–15)]

## 6 Analysing and Comparing Policies

The Carneades argumentation system provides a tool to analyze the legal effects of specific policies on the facts of cases. The tool is useful for evaluating and

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<sup>6</sup>These keys are stored in the “source” property of the metadata of arguments. The keys are the identifiers of the metadata records for documents in the references section of the argument graph.

comparing policies which formulate rules at a level of detail comparable to legislation or regulations.

To access the tool, click on the “policy analysis” item in the main menu of the system, shown on every page. This will take you to introduction page of the tool, which briefly explains the purpose of the tool and the following steps for using it.

1. Select an issue of interest.
2. Answer a series of questions to enter the facts of a case.
3. View an argument graph automatically constructed by the system by applying the alternative policy models to the facts of the case.
4. Select a policy to evaluate. This will take you back to the argument graph, with the effects of the selected policy highlighted.
5. Repeat the last two steps to try another policy.

## Policy Modeling Tool

[Introduction](#) [Issues](#) [Facts](#) [Arguments](#) [Schemes](#) [Policies](#)

This is the policy modeling tool of the IMPACT argumentation toolbox. The policy modeling tool provides a way to simulate the legal effects of specific policy proposals on the facts of test cases. The tool is useful for evaluating policies which formulate rules at a level of detail comparable to legislation or regulations.

The procedure for using the tool consists of the following steps:

1. Select an issue from the Green Paper of interest, among the issues for which sufficiently concrete policies have been proposed.
2. Answer a series of questions to enter the facts of a test case. Only relevant questions will be asked. To protect your privacy, no questions about real persons or events will be asked, but rather only about hypothetical test cases. As the questions are answered, the policy modeling tool is applying the rules of the different policies to construct legal arguments about the effects of the policies, given the facts of the test case.
3. Browse a map of the arguments constructed during the previous step, to see how inferences have been drawn by applying the rules of the various policies to the facts of the test case.
4. Select a policy to simulate and highlight in the argument map its legal effects on the test case. This will take you back to the argument map, with the effects highlighted.
5. Repeat the last two steps to evaluate and visualize the effects of another policy. Or return to the "Facts" page to modify the facts of your test case or enter facts for another case.

The tool can now guide you, step by step, through this procedure, beginning when you click on the "start" button below.

[Start](#)

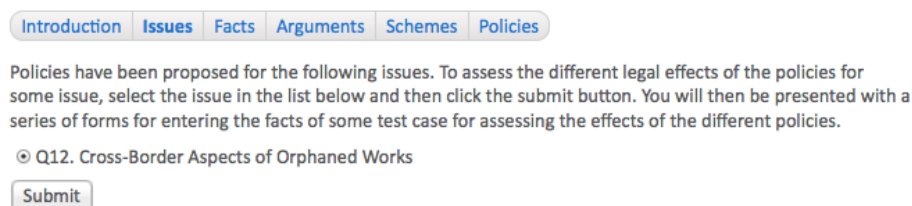
Figure 5: Policy Analysis Introduction

After reading the instructions on the first page, click on the “start” button at the bottom of the page to begin. This will take you to the “issues” page.



## 6.1 Selecting an Issue to Analyze

### Policy Modeling Tool



Introduction Issues Facts Arguments Schemes Policies

Policies have been proposed for the following issues. To assess the different legal effects of the policies for some issue, select the issue in the list below and then click the submit button. You will then be presented with a series of forms for entering the facts of some test case for assessing the effects of the different policies.

☒ Q12. Cross-Border Aspects of Orphaned Works

Submit

Figure 6: Selecting Issues to Analyze

In the figure, only a single issue is shown but in general they may be several issues to choose from. Select an issue, by clicking on a radio button, and then click on the “submit” button to continue. This will take you to the “facts” page for entering the facts of a case.

## 6.2 Entering Case Facts

The “facts” page asks a series of questions to gather the facts of the case. The process of asking questions is driven, in a goal-directed way, by the process of applying the rules of the model of the various policies to try to construct pro and con arguments about the chosen issue, using an inference engine. Only relevant questions will be asked, depending on the rules and your prior answers. Related questions will be grouped together, to facilitate a more coherent dialogue.

Be careful not to enter any information which would enable you or another person to be identified. Do not use real names, but rather pseudonyms or artificial identifiers, such as P1, for persons and organizations.

After sufficient facts have been entered to apply the rules of the policies, you will be taken to the “analysis” page of the tool. (You can return to the facts page at any time to check or modify the facts of the case. *Not yet implemented.*) The analysis page displays the argument graph constructed when applying the rules of the policies to the facts entered for the case. The user interface is exactly the same as the one described in the chapter entitled “Browsing, Visualizing and Evaluating Arguments”. The only difference is the content of the argument graph being displayed. Here we are viewing arguments constructed by an inference engine when applying policy models to the facts of a case, rather than manual reconstructions by analysts of arguments in source documents.

## Policy Modeling Tool

[Introduction](#) [Issues](#) [Facts](#) [Arguments](#) [Schemes](#) [Policies](#)

### Identifiers

*Please provide an identifier for the person interested in publishing the work, such as P1.*

is a person.  

*Please provide an identifier for the orphaned work, such as W1.*

is a work.  

---

### Purpose

*Will the work be used for commercial or non-commercial purposes?*

Does p1 use w1 for commercial purposes? ☒ Yes ☐ No ☐ Maybe  

---

Figure 7: Entering Case Facts

## 6.3 Viewing the Arguments Constructed from the Policies

### Policy Modeling Tool

Introduction Issues Facts **Arguments** Schemes Policies

Export Evaluate Map New Statement New Argument

#### Main Issues

1 ☐ p1 may publish w1.

#### Outline

- ☐ p1 may publish w1.
  - pro UrhG-31
    - ☒ p1 is a person.
    - ☒ w1 is a work.
    - ☒ p1 has a license to publish w1.
    - ☐ (valid UrhG-31)

Figure 8: Arguments Constructed from the Policies

The argument graph can be viewed using both a hypertext interface as well as graphically, in an argument map. Click on the “map” item in the menu bar of the analysis page to generate and view the argument map.

The next step is to select one or more policies to evaluate. Click on the “Policies” menu item in the menu bar of the policy analysis tool to view the available policies.

## 6.4 Viewing the Policy Models

All of the proposed policies which have been modeled are displayed. These can be alternative policies under consideration in a policy deliberation process. Alongside the model of each policy, using a rule language, there is a natural language description of the policy, possibly quoting and linking to the text of some document in which the policy was proposed. The descriptions will be shown in your preferred language, which can be selected on the home page of the Carneades system (*not yet implemented*). The rules of the model are shown in an easy-to-read format, generated automatically from the source code of the model, not the source code itself.

Select **Orphaned Works Policy Proposed by the Aktionsbündnisses “Urheberrecht für Bildung und Wissenschaft”**

The German “Action Alliance” on copyright for education and science proposes the following policies for handling orphaned works [Aktionsbündnis, pp. 6-7].

Licensing copyrights. (1) The author can grant a simple or exclusive license to others to use the work ... Exclusive rights to use a work give the licensee the sole right to use the work in the ways stated by the *along with the right to grant licenses to third parties* [§ 31 UrhG, emphasis added] ...

§ UrhG-31

**conclusion**

P may publish W.

**conditions**

- P is a person.
- W is a work.
- P has a license to publish W.

§ AB-52c-1-a

**conclusion**

P may publish W.

**conditions**

- P is a person.
- W is a work.
- P uses W for non-commercial purposes.
- P conducted a standard search for the copyright owner of W.

Figure 9: Viewing the Policy Models

## 6.5 Evaluating and Comparing Policies

To evaluate a policy to see how it would work given the facts of the case you have entered, click on the “select” button to the left of the title of the policy. This will take you back to the “analysis” page, again showing the argument graph, but this time visualizing what the legal consequences of the selected policy would be in the given case, if the policy were enacted and put in force. You can also view the results of the chosen policy in an argument map, by clicking on the “map” button in the menu bar.

To analyze the effects of other policies, go back to the policies page, by clicking on the “policies” button in the menu bar, and select another policy. Repeat this process to compare several policies.

## 6.6 Finding Policies with Desired Effects

(*Not yet implemented.*)

Rather than manually trying out a number of policies, one at a time, it is possible to automatically search for the policies with the desired result in your case, as follows:

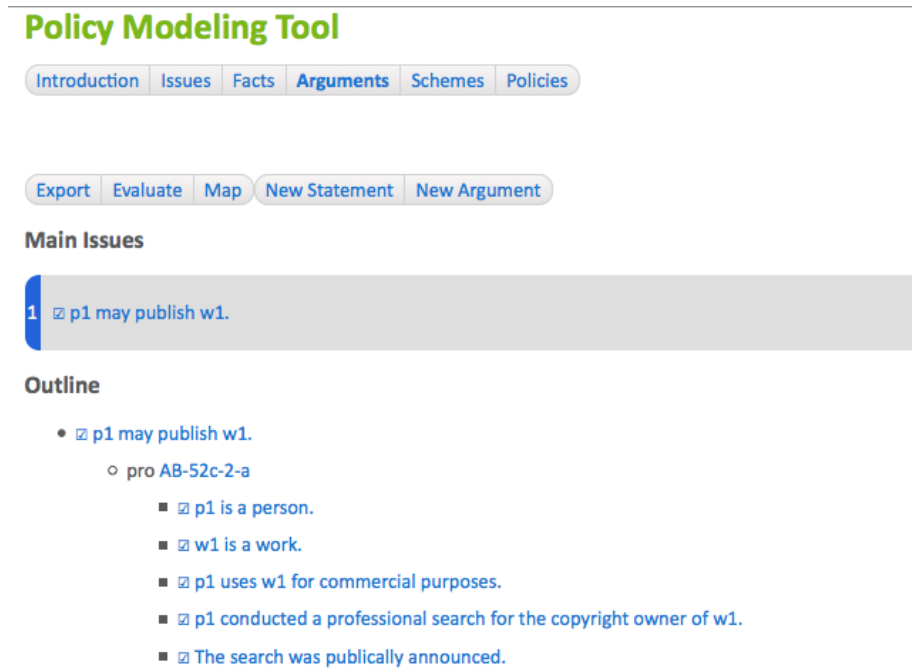


Figure 10: Viewing the Effects of a Selected Policy

1. In the menu bar of the “policies” page, click on the “find” button.
2. You will be asked whether the main issue of the case should be “in” (true), “out” (false) or “undecided”. Select your preferred alternative.
3. The system will then present a list of the policies, if any, which produce the preferred result in this case. This list has the same form and user interface as the policies page, but showing only the subset of the policies which achieve the desired result. You can now select from these policies, as before, to view the argument graph evaluated using the selected policy, to understand just why the policy leads to the desired result in this case.

## 6.7 Sharing Cases

You can share the cases you have entered with others, to allow anyone to see how the various policies work in this case and make it unnecessary for others to have to reenter the facts of the case.

Every case is stored in its own database on the server and assigned web address (URL) by the Carneades system. This URL can be used, by anyone, to view

and browse the argument graph constructed for the case and to compare the effects of the different policies on the case.

The URL to use for sharing cases is the URL of the argument graph view of the case. To copy the URL:

1. Click on the “analysis” button in the menu bar of the policy analysis tool.
2. Copy the URL shown in the address bar of your Web browser, where you type in URLs to visit web sites.

To share the case, paste this URL into an email, a blog or discussion forum article, or indeed anywhere else text can be entered.

*Not yet implemented:* The case will be read-only, not modifiable, by other users. (The case is editable only during the session in which it was created.) However, an editable copy of the case, with its own URL, can be created, as described in the next session.

## 6.8 Making Editable Copies of Shared Cases

*(not yet implemented)*

To make it easier to create variations of test cases, without having to reenter the facts they have in common, it is possible to creating a copy and then edit the facts of this copy. The copy will have its own URL, which can be shared with others on the Web, just like the original. The facts of the copy can be modified during the session in which the copy was created.

To copy a shared case:

1. Enter the URL of the case in the address bar of your web browser, or just click on some link with this URL. This will take you to the analysis page for viewing the argument graph of the case.
2. Click on the “copy” button in the menu bar of the analysis page. This will create the copy and then take you to the analysis page for viewing the argument graph of this copy. When you first visit this page, it will display a clear warning, so that you can be sure that the copy is being displayed, and not the original case.

You can now edit the facts of this copy during this session, and also share this copy with others in the usual way, as described in the Sharing Cases section of this manual.

## **6.9 Policy Opinion Polls**

## **6.10 Evaluating Policies Over a Set of Cases**

# **7 Editing Argument Graphs**

# **8 Modeling Policies and Argumentation Schemes**

# **9 System Administration**

# **10 Applications Scenarios**

# **11 Credits**

- Conception and Design
  - Tom Gordon
  - Douglas Walton
- Programming
  - Pierre Allix
  - Stefan Ballnat
  - Tom Gordon
  - Matthias Grabmair
- Funding (EU Projects)
  - Standardized Transparent Representations in order to Extend Legal Accessibility (Estrella, FP6-IST-027655), 2006-2008.
  - Quality Platform for Open Source Software (Qualipso, FP6-IST-034763), 2006-2010.
  - Integrated Method for Policy making using Argument modelling and Computer assisted Text analysis (IMPACT, FP7-IST-247228), 2010-2012.
  - The MARKet for Open Source – An Intelligent Virtual Open Source Marketplace (MARKOS, FP7-ICT-317743), 2012-2015.

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