Carneades User Manual

Tom Gordon

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Contents

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:

- 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 chapter on argument graphs provides a concise and easy overview of the underlying data model used by all the tools and is recommended to be read first by all users. 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 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".

2.1 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 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 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.

2.2 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.

2.3 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.

2.4 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.

2.5 Metadata

The argument graph as as 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 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.[1] 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.

[1] http://en.wikipedia.org/wiki/BibTeX

3 Browsing, Visualizing and Evaluating Arguments

This chapter of the Carneades user manual explains how to:

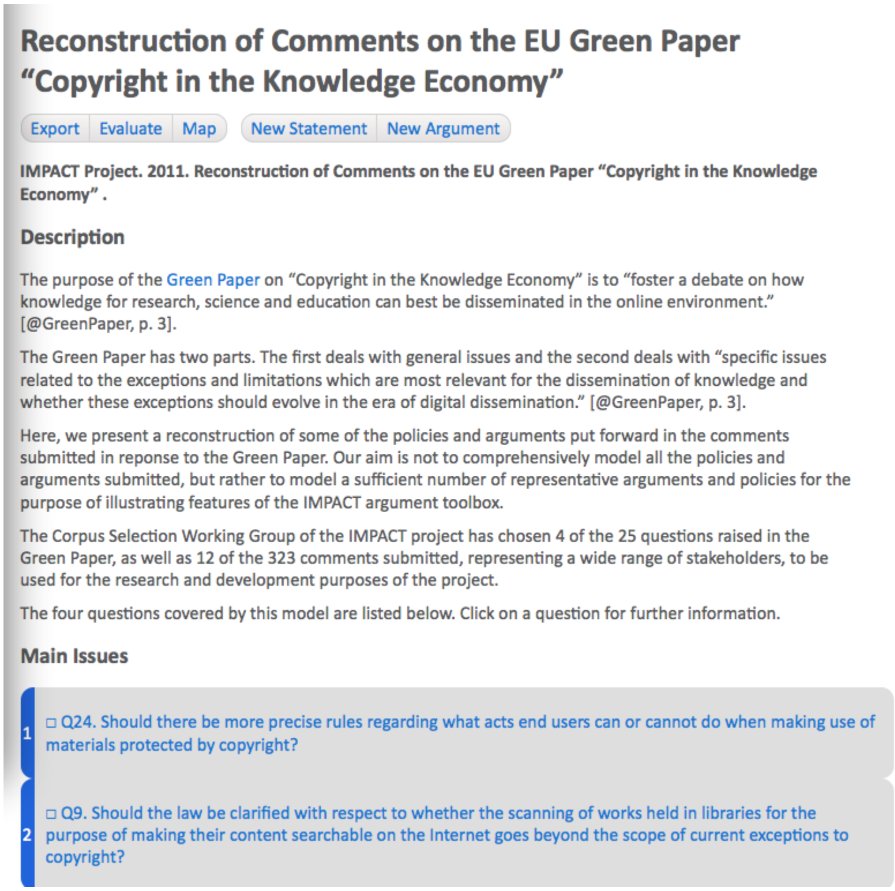
- Access and use the home page of an argument graph on the World-Wide Web.
- Use hypertext in web pages to browse an argument graph.
- Visualizing argument graphs in diagrams, called "argument maps", and using these maps to navigate to more detailed views of statements and arguments.
- Evaluate arguments 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.

3.1 The Argument Graph Home 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.

The home page of an argument graph 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”

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 reponse 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 Home 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.

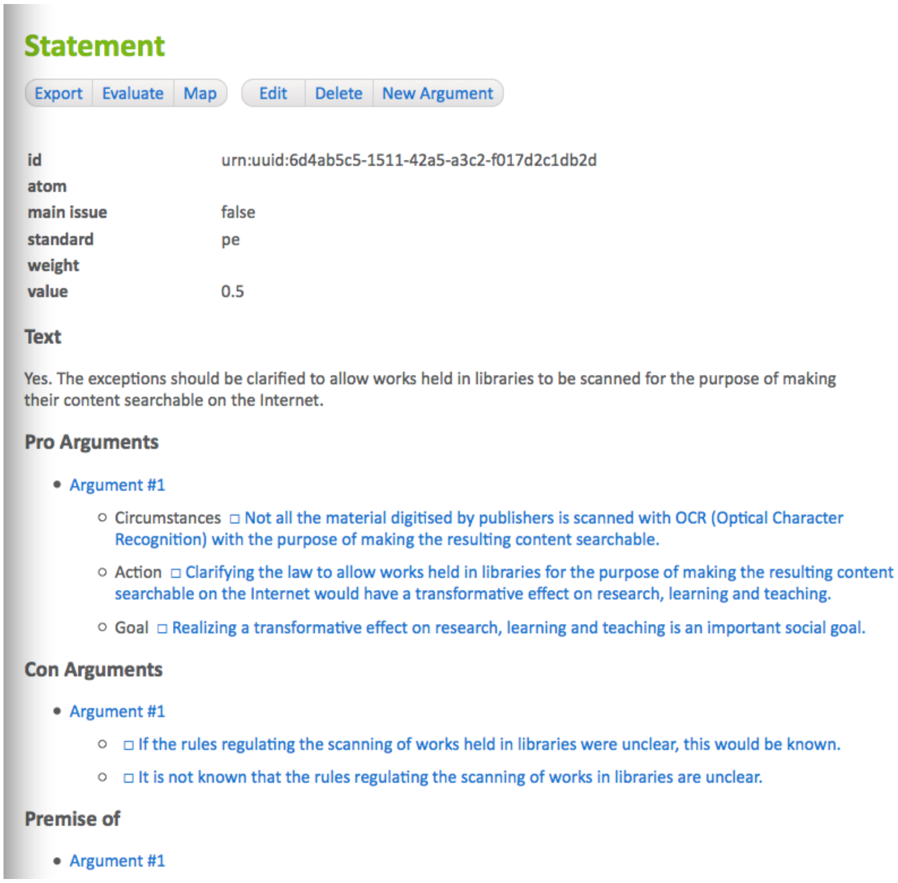
- A list of *references* to the source documents used to construct the argument graph. For documents available on the Web, the reference will include a hyperlink to the source document.

3.2 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.

3.2.1 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.



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.

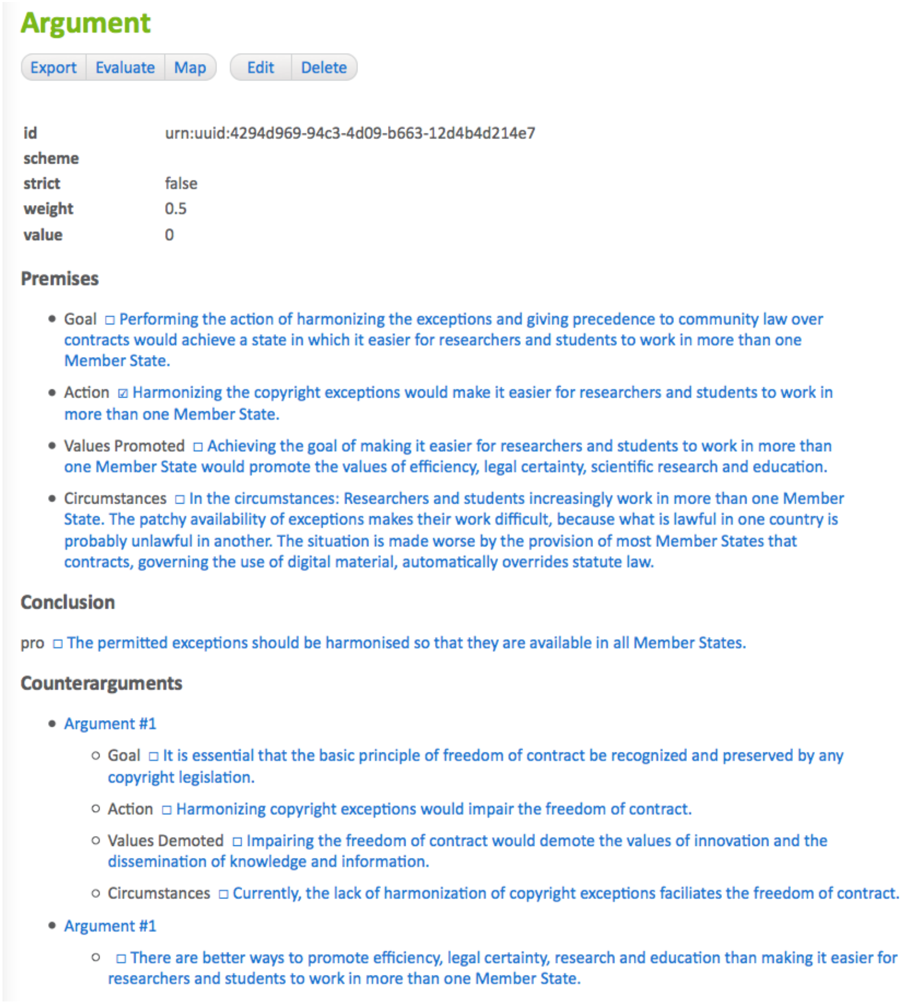
3.2.2 Argument Pages

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.

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 acceptability of the conclusion, as for the premises.



Argument

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 faciliates 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

Finally, a list of counterarguments is shown.[2] 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.

3.3 Visualizing Argument Graphs in Argument Maps

The menus of the argument graph home 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.

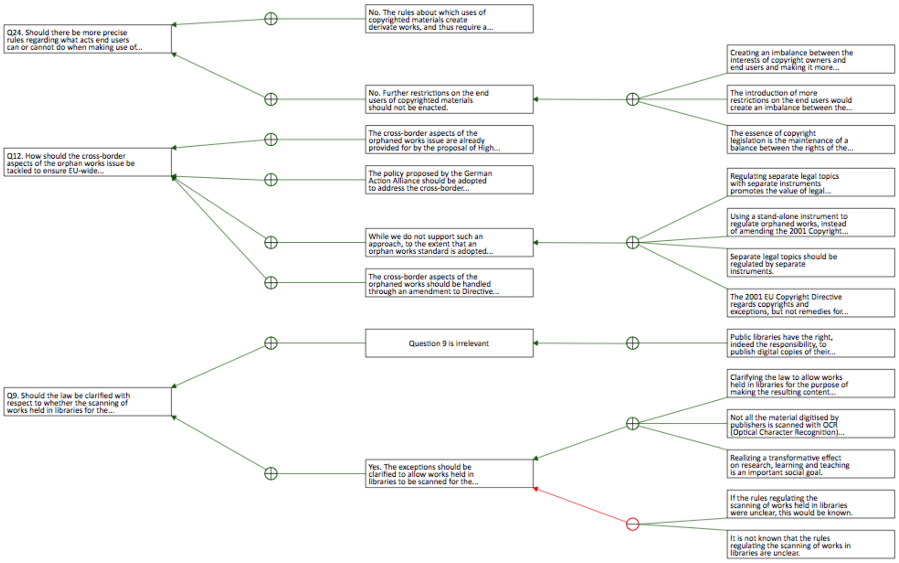

Q24. Should there be more precise rules regarding what acts end users can or cannot do when making use of...
No. The rules about which uses of copyrighted materials create derivate works, and thus require a...
No. Further restrictions on the end users of copyrighted materials should not be enacted.
Creating an imbalance between the interests of copyright owners and end users and making it more...
The introduction of more restrictions on the end users would create an imbalance between the...
The essence of copyright legislation is the maintenance of a balance between the rights of the...
Q12. How should the cross-border aspects of the orphan works issue be tackled to ensure EU-wide...
The cross-border aspects of the orphaned works issue are already provided for by the proposal of High...
The policy proposed by the German Action Alliance should be adopted to address the cross-border...
Regulating separate legal topics with separate instruments promotes the value of legal...
Using a stand-alone instrument to regulate orphaned works, instead of amending the 2001 Copyright...
While we do not support such an approach, to the extent that an orphan works standard is adopted...
Separate legal topics should be regulated by separate instruments.
The cross-border aspects of the orphaned works should be handled through an amendment to Directive...
The 2001 EU Copyright Directive regards copyrights and exceptions, but not remedies for...
Question 9 is irrelevant
Public libraries have the right, indeed the responsibility, to publish digital copies of their...
Clarifying the law to allow works held in libraries for the purpose of making the resulting content...
Q9. Should the law be clarified with respect to whether the scanning of works held in libraries for the...
Not all the material digitised by publishers is scanned with OCR (Optical Character Recognition)...
Realizing a transformative effect on research, learning and teaching is an important social goal.
Yes. The exceptions should be clarified to allow works held in libraries to be scanned for the...
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.

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 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

[2] 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.

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 home 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.

3.4 Evaluating Arguments

3.5 Exporting Argument Graphs to XML

3.6 Generating Outlines

Not yet implemented

4 Formulating, Polling and Comparing Opinions

5 Analysing and Comparing Policies

6 Editing Argument Graphs

7 Modeling Policies and Argumentation Schemes

8 System Administration

9 Applications Scenarios