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D3.3 Semantic Tagging, Annotation and Mapping Environment

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The CATALYST project consortium is composed of:

SO	Sigma Orionis	France
I4P	Imagination for People	France
OU	The Open University	United Kingdom
UZH	University of Zurich	Switzerland
EN	Euclid Network	United Kingdom
CSCP	Collaborating Centre on Sustainable Consumption and Production	Germany
Purpose	Purpose Europe	United Kingdom
Wikitalia	Wikitalia	Italy

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Executive summary

The present document is a deliverable of the CATALYST project, funded by the European Commission's Directorate-General for Communications Networks, Content & Technology (DG CONNECT), under its 7th EU Framework Programme for Research and Technological Development (FP7).

It describes one of the software components of the CATALYST ecosystem of Collective Intelligence Technologies: **LiteMap**.

The document presents first the requirements from which the tool is driven in the context of the CATALYST challenge and it describes the main goals and expected end-users of this software component. The prototype system is presented in terms of both higher-level architecture and main functionalities. Additionally, to provide a more effective demonstration of these functionalities, the document provides short Demonstration Videos to exemplify the system in use.

Finally a link to the running and functioning alfa version of the tool is made available: http://maptesting.kmi.open.ac.uk/. This is a link to the testing website and it shows the testing data gathered in the last 4 months in collaboration with use-case partners (CSCP). The CSCP use-case organisation has been actively involved in a process of agile development of the tool and has had the chance to propose ideas for new features, require user interface changes and report bugs.

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1. Introduction: In the context of CATALYST goals

This deliverable is an outcome of Task 3.3 whose main goal is to establish the mechanisms and tools for **Data Harvesting and Web Annotation**.

From a user scenario perspective, enabling data harvesting and Web annotation means enabling community managers and community members to map and summarise content of an online debate that is hosted in or outside the CATALYST ecosystem. This is a key feature that aims at tackling some of the key pain points of online community platforms and responds to some of the high level system requirements that have been identified in D2.1 (see page 37-39 of D2.1) and that are prerequisite for massive adoption of deliberation tools. Specifically, Data Harvesting and Web Annotations helps reducing: Poor Participation, Poor Summarisations, Platform island and Balkanizations by:

- Allowing participant to continue using their current tools (web browser) to interact with the CATALYST ecosystem.
- Allowing participant to continue using their current forum (mailing list, Facebook group, Twitter) to interact with the deliberation group. Similarly to the bridge across tools, a bridge needs to be built across proprietary social networks.
- Allowing connection making and ideation across forums and tools
- Supporting the creation of human generated summaries to represent higher-level sensemaking on the debate (connections and meaning making).
- Enabling the creation of argument maps as visualisation method to help summarise the state of a debate, important contributions, and focus users attention on missing, contradictory, conflicting points.
- Using visual maps to communicate results

From a technical perspective, enabling Data Harvesting and Web Annotation means establishing the data model, semantics and the operating environment in which:
- Pages and textual fragments in each partner's platform, and any or Social Media tool, can be directly bookmarked and annotated within a web browser,
- Harvested fragments can be used to create nodes, which can then be meaningfully connected to create maps (semantic graphs),
- Harvested content and maps can be stored, in a form that is accessible to CI analytics and visualisation services.

The above higher level user and technical requirements have been met by designing and implementing LiteMap, a Web tool for Data Harvesting, Web Annotation and Argument Mapping. LiteMap will be described and demonstrated in the following sections.

2. LiteMap

2.1 What it does

LiteMap is a Web tool for mapping out visually the content of online debates that may be happening in other forums or Websites. It is a place to harvest the main issues, ideas, pros and cons in the online debate and to connect those in meaningful network graphs. It is a tool for data harvesting, web annotation and visual summarisation and it can be used by individuals or in groups.

The main components of LiteMap are:
- A bookmarklet to harvest content from the Web
- 2-D mapping canvases (the Maps) in which harvested content can be connected to build argument maps. These are network representations of the issues, ideas, and arguments around a specific discussion topic.
- A Website to collaboratively build and share maps with a wider community.
- A Visualisation Dashboard to support sensemaking and reflection on the mapping process.

LiteMap is meant to be distinctive in its use of advanced analytics to show the best argued ideas, and visualisations of the activities of an online community. The LiteMap Visualisation Dashboard is part of the Collective Intelligence Dashboard work (T3.9) and will be therefore focus of development for the next LiteMap release, because it requires the study and evaluation of the Dashboard to be completed (Month 14).

2.2 Who is it for

2.2.1 Communities

LiteMap is designed to help community managers to summarise and present the state of a debate with the overall goal in mind to: trigger further community's reflection, promote deeper understanding and improve engagement with the debate.
LiteMap is also a tool to organise community's contributions, reduces idea duplication, and supports content analysis and summarisation.
Additionally, the analytics dashboard onto the maps helps community managers to spot connections between ideas, detect gaps in knowledge, discover new patterns and produce visual summaries of the community debate.
LiteMap is also designed to allow peer-moderation so that Community Managers can identify and reward the best community members and invite them to become "mappers" of the community debate.

2.2.2 Community Members

LiteMap can be also used by engaged community members who what to move from simple debate participation to community moderation. This is a way for users to become "mappers" of the community debate.
Litemap can be also seen as a mapping tool for personal summarisation and self-reflection, and can be used by users who want to build a visual representation of their own view of a topic or debate. LiteMaps can be also used to communicate personal ideas to others, or to point the community's attention to important issues.

3. Software Description

3.1 High Level Architecture

The main purpose of this section is to accompany the technical demonstration of LiteMap and provide the necessary background information to be able to put into the right perspective the type of application developed. It is therefore not intended to be a full-fledged design document of this component. Some more details can be found in the initial architecture deliverable, and a full-fledged design document is expected at the end of the project.

3.1.1 Code Specification & Description

The LiteMap website uses a Linux server, the code is written in PHP and it currently uses a MySQL database, with the possibility to use other database types in the future. The website pages are written in PHP, HTML, Javascript, CSS.

The LiteMap website code is roughly divided into 7 main component (See image below):
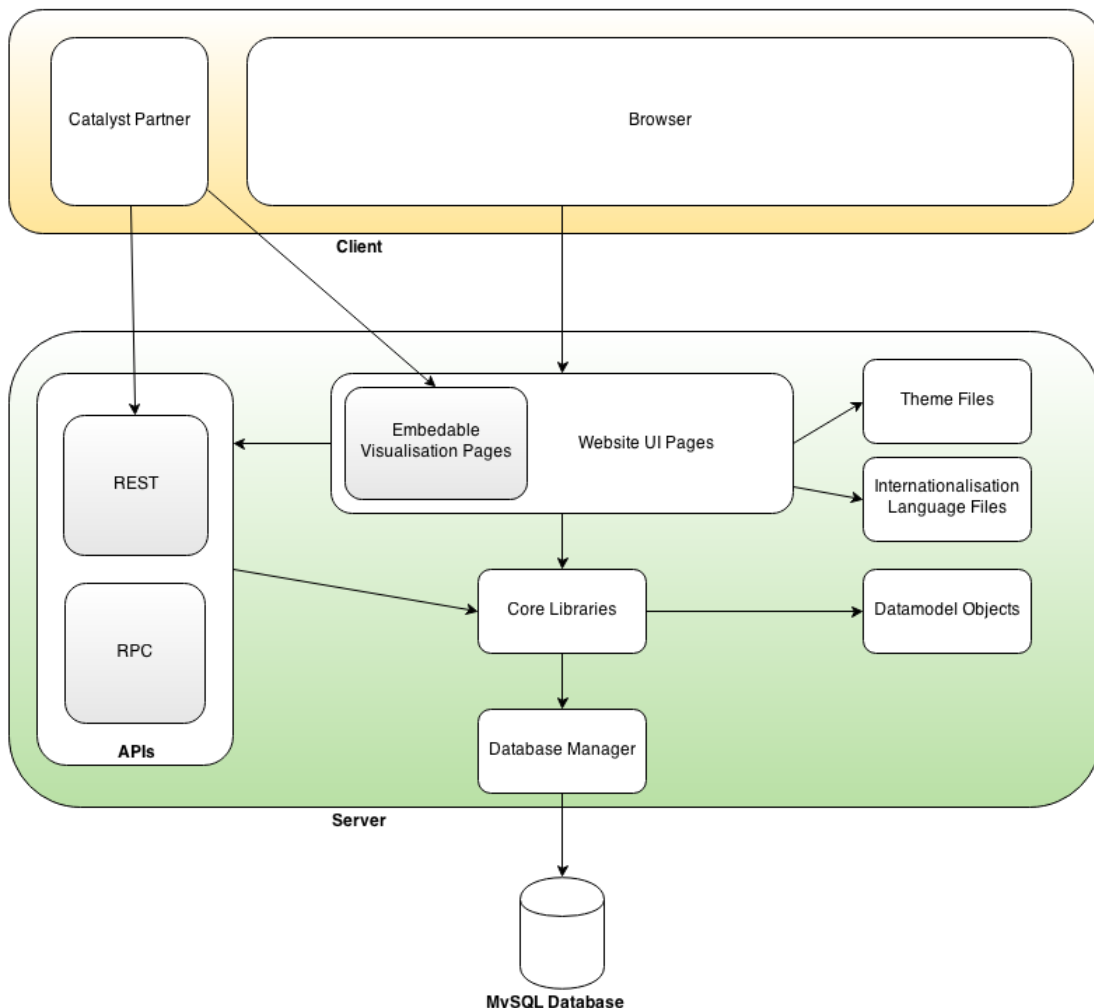
1. The **Website UI Pages**, including the **Embeddable Visualisation Pages**, and all other pages like forms, the dashboard pages etc..;
2. The **Themes Files**, which consist of collections of CSS files and images to be applied to the website pages;

3. The **Internationalisation Language Files,** which hold the site text to be translated when required;
4. The **API** code, which handles both **RPC** (Remote Procedure Call) ajax requests from the website pages and **REST**ful (Representational state transfer) api requests from CATALYST partners or the website pages. RESTful api calls will return *jsonld* formatted data to the CIF (CATALYST Interchange Format) specification.
5. The **Database Manager,** which handles calls to the MySQL database (or potential others), and works together with a library of basic database utility functions and the files containing the sql statement elements to be used (or replace for different database);
6. The **Datamodel Objects** code classes, which hold the records from the database in a collections of object and also manage enforcing the model relationships;
7. The **Core Libraries** of code:
   a. Servicing the api calls, including formatting the replies, handling site access, handling data history tracking, file path management;
   b. The IO (input/output) code to processing data, like analytics from CATALYST partners, plus any specific data imports or exports, like importing from Compendium maps etc.;
   c. The Admin code which handles hidden system administration interface elements, and server side tasks;
   d. The multi-site code. LiteMap is built on the Evidence Hub multi-site code architecture. So one installation of LiteMap could potentially run many different instances of that site, each with different theming, language, database, configuration etc.

3.2 Main Functionalities

As described in Section 2 of this document, LiteMap is expected (at this stage) to provide three main functionalities: *Web Annotation, Grouping mechanisms,* and *Mapping functions*. Analytics and Visualisations functionalities are object of Task 3.9 and they will be therefore part of the second phase of development. In the following, we describe the main functionalities already developed.

3.2.1 Web Annotation

In order to allow users to harvest content without leaving their browser, the LiteMap Web Annotation function has been implemented in form of Browser's Bookmarklet.
It therefore consists of a separate tool that needs to be added to the Browser of choice.
The main goal of the LiteMap toolbar is to enter data into LiteMap while browsing the web and it has been designed and coded so that:
- It works on all the main browsers;
- It allows different annotation types
- It provides a lightweight annotation toolbar that does not intrude the Webpage browsing.

3.2.1.1 How to get the toolbar

Specific guidelines are provided to user to install the bookmarklet:
http://maptesting.kmi.open.ac.uk/help/builderhelp.php
To get the toolbar users have to simply bookmark the link provided on the Website: **MapTesting Bookmarklet**
If they are using **Firefox**, **Chrome** or **Safari** they can drag the above link to their browser Favorites toolbar.
If they are using **Opera**, they just have to right-click on the link above, select 'Bookmark Link...' and then choose to 'Show on bookmarks bar'.
Only for IE 9: users can drag the above link to their browser Favorites toolbar but they will get a security warning message to which they just have to select OK.

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3.2.1.2 How to annotate a page

Once users get the toolbar, they can browse to the page they want to annotate and click on the LiteMap bookmark.

At this point a small toolbar will appear on the left hand side of the page (See Figure 1). The toolbar has 4 different icons that represent the four types of annotations that can be made. These represent the main elements of an IBIS argument map: issues, ideas/solution, argument in favor/pro, argument against/con.

Users can select the text they want to annotate and click on the toolbar icon that represents the type of annotation they want to make.

When clicking on the icon of choice a pop-up window will appear in which free-text can be added to describe the annotation.

After saving the annotation, an icon is inserted in-line in the Webpage where the annotation was added. When rolling over the icon, the added title appears and an Explore link appears connecting the annotation to the LiteMap database in which the data has been harvested (See Figure 1).
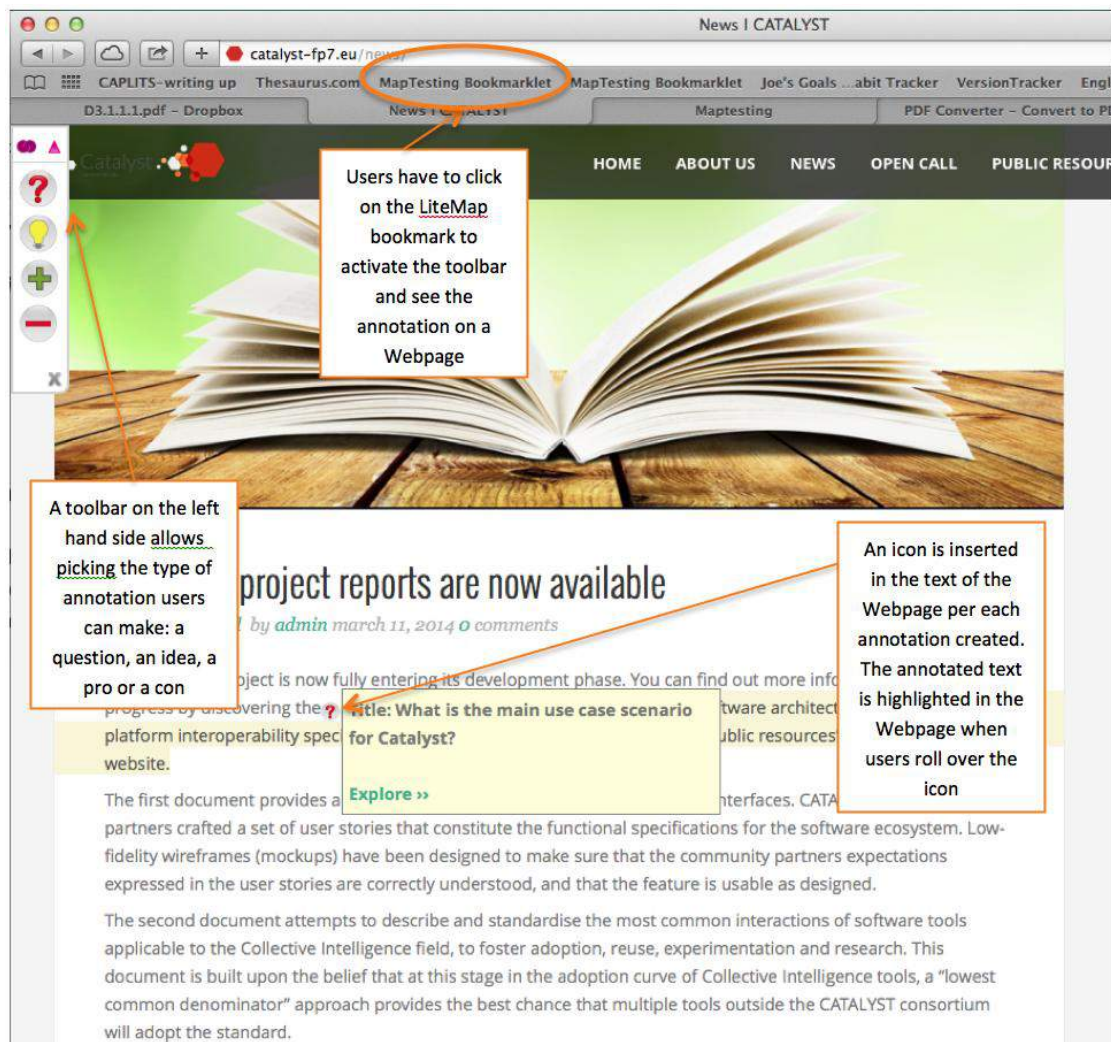
Figure 1: Webpage snapshot showing the LiteMap toolbar, the LiteMap bookmarklet in the bookmark bar, and highlighted in yellow, a "question" annotation with an Explore link to the LiteMap Website

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3.2.2   Grouping

LiteMap allows for a grouping mechanism of both people and maps. Users can create their own Annotation and Mapping group. This will be a space in which a group of editors can create more than one map. Ones a user is signed up to the Website and is signed in to edit maps, Groups can be created directly form the homepage by clicking on: "Create New Group". Each group can be given a Name, Description, Website and Photo (See Figure 2).
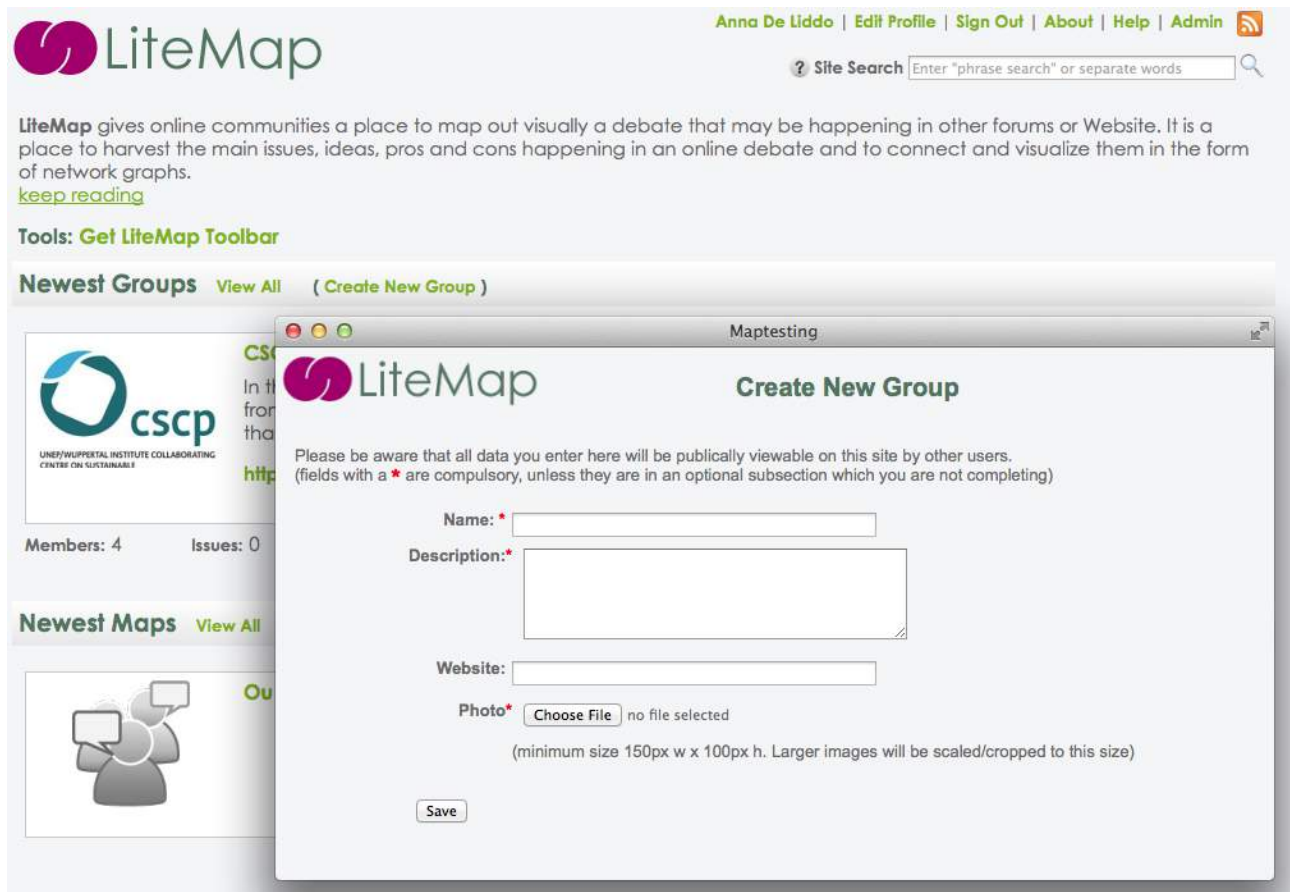

Figure 2: LiteMap Homepage and pop-up window to "Create New Group"

3.2.3   Mapping

Maps can be created both inside and outside a specific mapping group by clicking on the "Add Map" link in the group page (for creating a map in a group, see Figure 3) or in the homepage (for creating maps outside a group).
A pop-up window allows adding a title, image and description to the new map (see Figure 3), as well as allowing to decide on the privacy setting of the map. By default maps are selected to be public to promote transparency and idea sharing, but users can still de-select the public option to make the map private.

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Figure 3: Group Page and Popo-Up window to "Create New Map"

Once the map is created the Title of the Map is also added as Map Topic and it becomes the top-level node of the argumentation tree.

At the bottom of the topic node there is a small arrow. By rolling over that arrow users can add more than one issue to be tackled about that topic. Then from each issue, ideas can be added; and finally arguments pro and con can be added to ideas. The Mapping structure consists of a simplified IBIS model in which the Map topic is used to group issues (See Figure 4).

In order to add a node to the map, users can roll over the bottom arrow of each node. A Menu options will show all the options available for that mode (See a menu example opened from an issue node in Figure 4).

There are four main option types in the menu: add, edit, explore and link to. In the following we explain the menu by function.
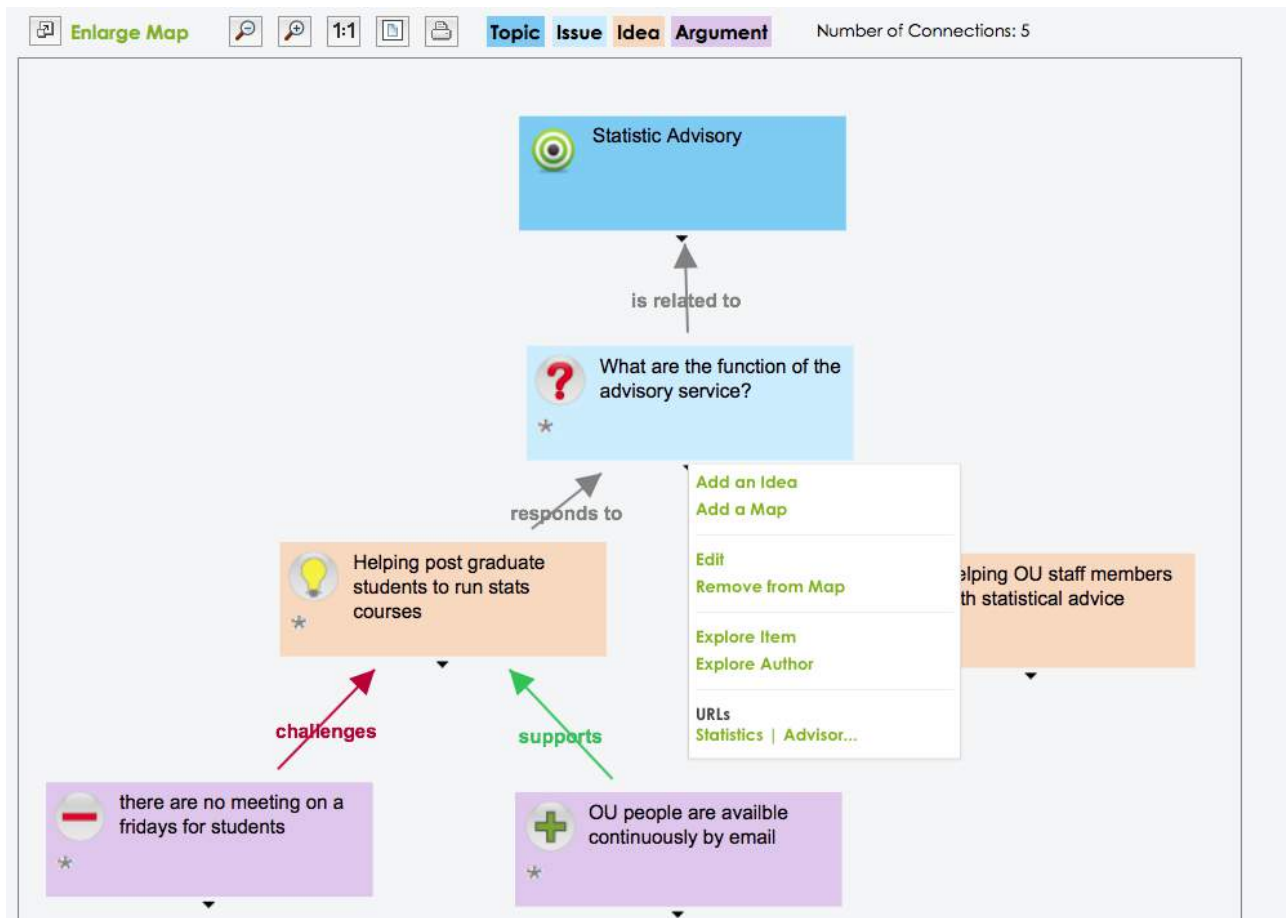
Figure 4: Example argument map structure with "Statistic Advisory" as topic and one issue, two ideas and two arguments connected with IBIS semantics.

3.2.3.1   Adding

The add options show all the possible node types that can be added to the selected node as established by the IBIS model (for instance, from an issue node you can only add ideas and hyperlinks to related maps, see Figure 4). Connections outside this model are not allowed. This is because the CATALYST partners have chosen a simplified IBIS as data model to enable communication, data exchange and distributed processing of analytics and visualisations across the consortium platforms. At present, in order to make the most out of the CATALYST Analytics and Visualisation power, the data model has been constrained to IBIS. There is an on-going conversation in the consortium about the opportunity to devote effort, in the following phase of development, to opening the mapping model and semantics beyond IBIS. This opportunity will be negotiated in a way that does not affect existing schedule and deliverables and therefore may or may note be part of the following development of LiteMap.

Adding works as follow: when clicking for instance the "add idea" button, a pop-window picker appears (see Figure 5) and users can either select ideas between the content harvested with the bookmarklet or they can create new ideas (see Figure 5). The new ideas can again be given a title, description and more than one URL resource can be associated to it. This means that annotation to webpages can be done not only form the bookmarklet but also form the Map interface.
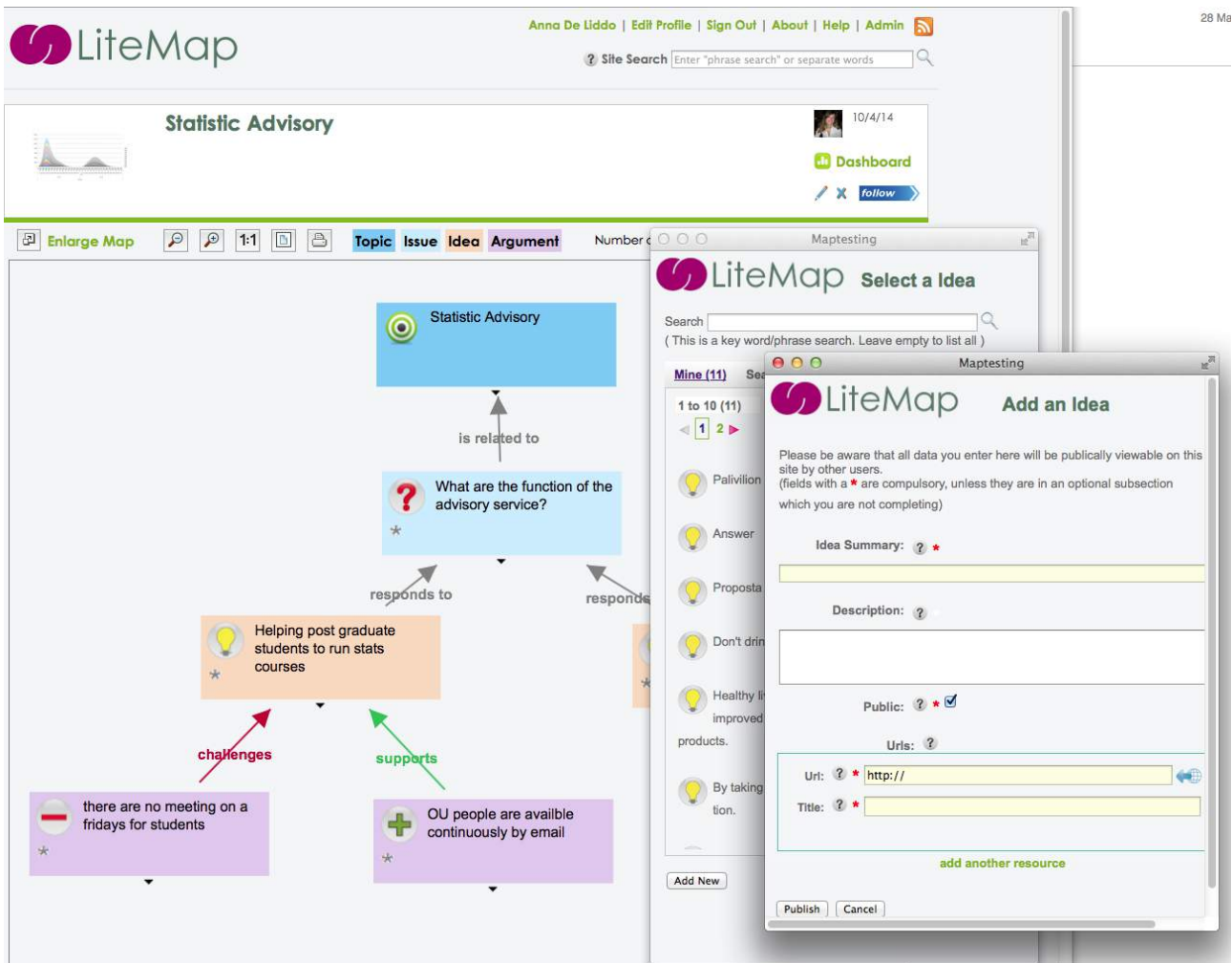
Figure 5: "Idea Picker" and "add new" idea pop-up windows that are activated by the "add idea" link in the menu option.

3.2.3.2   Editing

The other options in the Menu list are *edit* (to edit metadata of a node) and *remove* a node from the map (the node will be not deleted from the system and will still be available in the user personal data list for future use).

3.2.3.3   Exploring

The Explore item and Author option allow users to get more information on the node and its author. For instance the explore page of a node tells users if the node is contained in more than one map, allows *following* or checking the *followers* of the node, provides *alternative visualisations* of the node context.
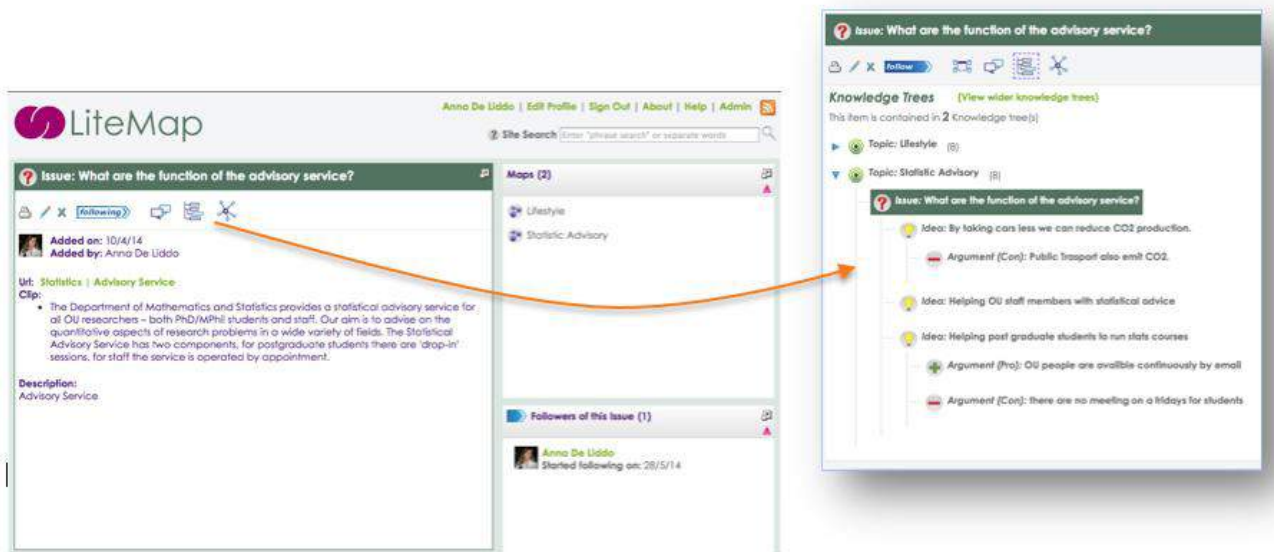
Figure 6: Explore page of a Map's node, showing followers and alternative visualisations (e.g. threaded visualisation on the right hand side)

The Explore author link takes to the Author webpage where all the data created and some analytics on the author's activities are presented to the user.

3.2.3.4   Hyperlinking

Finally the link to the URL allows navigation to the Webpage from which the data has been harvested. The navigation is both ways so from the browser users can go back to the Map view (This feature is demonstrated in the third demonstration in the next section).

4. Demonstrations

As a way to describe the tool in action and exemplify LiteMap features, we created three demonstration screencasts. All the Demo Videos have been uploaded to the Catalyst YouTube channel at: https://www.youtube.com/user/CATALYSTFP7

In the following we describe the video content and provide links to the screencasts.

4.1   How to Harvest Online Debate Content with LiteMap

This video demonstrates how to get and use the LiteMap bookmarklet. It also shows how to harvest and annotate an online discussion in Facebook directly thought the browser. The Screencast also shows the LiteMap annotation icons appearing in-line in the Facebook page, together with the highlight of the annotated text.

Watch the Video at: http://youtu.be/uBzVLUDIxE8

4.2   Summarising and Mapping Arguments Visually with LiteMap

This video shows how, after content has been harvested with the bookmarklet, it can be used to create argument Maps.
This video demonstrates how to summarise visually the issues, ideas and arguments in a 2-D canvas and how to connect them to build an argument map. The map can be created either building on harvested content (captured from online debates posts hosted on some other website) or adding new ideas to better clarify and structure the conversation. This demonstrated feature show how LiteMap allows to bring ideas, arguments and resources from more than one debate, hosted in possibly even different social media tools, in one unique and coherent map, thus overcoming issues of platform island and balkanisation.

Watch the Video at: http://youtu.be/THU4ae1hA2s

4.3   Using LiteMap to map an online debate on the Utopia's platform

Online communities often have their community platforms already in place and it is difficult to move them to another tool they are not familiar with. One big challenge to Collective Intelligence is therefore connecting communities that are "isolated" in different platforms and allowing cross fertilisation of ideas between community platforms. This video provides a real example of how LiteMap has been used to map the main issues, ideas and arguments raised in a conversation hosted on the Utopia platform. Utopia is a content management system (built on Synphony), which has a space for online discussion. In the video we demonstrate how LiteMap can be used to navigate from the Utopia discussion to the Argument Map and vice-versa, thus allowing meaningful referencing of content and opening up the mapping of ideas also outside the Utopia Website. This example has been created by CSCP as demonstration of the first community effort to engage with the tool.

Watch the Video at: http://youtu.be/0Mlc4DJZ4Ts

5. Conclusion and Future Directions

This document presented the first LiteMap prototype, the main functionalities implemented so far and demonstration screencast of the tool in action.

The LiteMap testing website can be freely accessed and tried at: http://maptesting.kmi.open.ac.uk/

We plan to release the LiteMap software by the end of the project under LGPL license. This implies that all external libraries we are using or intend to use will be compatible with this license.

Finally, some considerations on the main LiteMap features and their future directions can be anticipated:

- At this stage, the *bookmarklet* works with all the main Web browser. In the future we may develop a sidebar to allow coupled visualisation of the map and the Webpage.
- *Groups* have been implemented with a "free to join" criteria. This means that users can just decide to join a mapping group and they will be automatically added to the list of members who can edit and contribute to the map creation. In the future we may add moderation mechanisms for group joining. Privacy has been implemented at the map level and not a group level so if a map is in a group and it is made private this is visible only to the members of that group.
- For what concerns *mapping,* future development may involve "opening" the data model or extending it to allow better interoperability and bigger mapping power.
- Finally for what concerns alternative Visualisation to the graph network, there will be main focus of future work.

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