Dear Hathi & reviewers,

Attached please find our revised "A Review of Argumentation for the Social Semantic Web", tracking number 10-102.
http://www.semantic-web-journal.net/content/review-argumentation-social-semantic-web

Our sincere thanks to all three reviewers for their extensive comments, which we have used to rework and revise the paper substantially.

The main changes in the paper are as follows:

- Following the introduction we provide a short background section on argumentation and on the Social Semantic Web, suggested by Fouad Zablith.
- We have added a Requirements section, as Fouad Zablith suggested, also including example applications that we would envision.
- As Iyad Rahwan suggested, we have restructured the coverage on theoretical models, to present a single section covering argumentative and linguistic models. This has allowed increased coverage of models (e.g. Walton's critical questions, Dung's argumentation framework, value-based argumentation frameworks, pragma-dialectics, metadiscourse/structure).
- A new section is devoted to applications of the theoretical models, including new material as well as existing material, such as the computational linguistics approaches.
- As Iyad Rahwan suggested, we have moved the Tools section to the Appendix. A second appendix now covers the matrix comparison of these tools.
- We have added coverage in the tools appendix on Belvedere and CMaps, the two systems suggested by Simon Buckingham Shum which meet our coverage criteria.
- We have added a new section that further discusses features of these tools, highlighting examples in various categories.
- As Simon Buckingham Shum suggested, we have revised the conclusion to include further discussion of the range of adoption of tools, usability issues, and the dissemination of argumentation tools.
- In the conclusion we have also added more analysis, discussing the obstacles to manifesting the Social Semantic Argumentation Web, along with a research agenda.

We look forward to your feedback on the revised manuscript, and have further responded to the reviews in the following.

Sincerely,

Jodi Schneider, Tudor Groza, and Alexandre Passant

Solicited review by Simon Buckingham Shum:
This is a well written survey paper, introducing the reader to rapidly growing field of argumentation and debate on the web, with specific reference to how it relates to social and semantic strands. The survey demonstrates that this is not only a topic of interest in research labs, but also a pressing concern for many institutions who are developing web-based platforms to meet their own needs, eg. in education and government. I anticipate that this will become a standard reference for the field.
The paper orients the reader to the diverse theoretical backgrounds from which current initiatives derive, at an appropriately general level for a survey article. The reader will not understand them in any depth, but is made aware of relevant sources for more detail.
As appropriate for this journal, the paper pays particular attention to work on semiformal/formal representational schemes associated with modelling disagreement and argument, before providing a comprehensive survey of many tools. While some of these are demonstrator research prototypes no longer available, many of the systems are online for the reader to try, confirming the rapid growth in this field in recent years.
Several helpful taxonomies are used to classify the tools, which help distill the survey into overview form.
The concluding comments highlight some relevant issues that emerge, such as the tension between socially-oriented web apps with very lightweight ontologies, designed to make it as easy as possible for many people to contribute, versus more detailed schemes for serious analysts who need finer-grained control of their argument networks. A brief section on usability might relevant here, in which usability is defined, at least in part, with respect to the target audience. An e-democracy tool targetting the public at large will set the adoption bar very low, compared to a tool for in depth literature, philosophical, or intelligence analysis. In this context, there is little discussion of adoption levels of the tools.
The reader is not given many clues as to whether they are reading about a small-scale demonstrator or a widely used system. However, it is recognised that such data may in fact be unrealistically hard to obtain, and it may be beyond the bounds of the article to mine this data. As mentioned, many of the systems are online for readers to gauge adoption and usability for themselves.

However, having read about so many tools -- making web argumentation one of the largest and apparently rapidly growing fields in the social-semantic web -- the reader would value a closing comment on the maturity of this field. Would the authors argue that it has moved firmly from the academic lab, where it was 10 years ago, into the mainstream?

We have revised the conclusion to include further discussion of the range of adoption of tools, usability issues, and the dissemination of argumentation tools.

> 10.2. Current Use
> While argumentation support has become more mainstream, it is still a niche. While there is a desire for public discussion systems, especially in areas such as e-government, social discussion systems and social networks are driven by network effects (e.g. you are persuaded to use them by the ability to communicate with your friends and colleagues) and by ease of use. Argumentative elements in generic social media tools are very basic: Facebook and Google Plus use ‘Like’ and ‘+1’ buttons, which imply a semantics of agreement; YouTube adds a ‘dislike’ button, and flagging posts for moderation (e.g. on Craigslist) or downvoting posts (e.g. on StackOverflow or Reddit) also implies dislike.
>
> With existing systems, discussed in the Appendix, there is a continuum from those with little use to those with wide use. Some (non-research) sites have few users and seem to have been abandoned. Some research prototypes are not accessible at all (and have been discussed based on papers and screenshots). Other research prototypes are available, and some seem to have users. Some are widely (or at least somewhat) used – showing (perhaps) what’s needed to build a Social Web infrastructure for argumentation.
>
> Argumentation support has not yet moved firmly from the academic lab, into the mainstream. While discussion is widespread, argumentation needs are often specific to the reasoning schemes used – which vary by discipline and area. Such constraints simplify the reasoning process for

humans as well as for argumentation support. Further, in dialogue, most argumentation happens informally: we can count on our conversational partners to indicate what is missing and to demand that we explain what is unclear to them. It is difficult to systematically indicate assumptions and to make reasoning explicit; while this is needed for ideal reasoning support, it is not feasible or reasonable to expect in everyday discourse. This leads into a discussion of usability.

Usability needs depend on the task at hand and the target audience. Tools for in-depth analysis by experts can be more complex and involved than those for casual use by the general public. E-government and de- liberation tools have the strictest usability needs for this reason.

Detailed points:
Omitted from the survey:
* Dan Suthers' CSCL system Belvedere
Thanks, added coverage of this.

* Michael Hoffman's work, using CMaps:http://www.spp.gatech.edu/aboutus/faculty/MichaelHoffmann
Thanks, added coverage of this.

* Theodor Scaltsas mapping philosophical arguments:
http://www.philosophy.ed.ac.uk/people/view.php?name=theodore-scaltsas
This does not appear to meet our inclusion criteria (collaborative, Web-based, with argumentative discussion components): rather than conversations this appears to be analyses. If there is a discussion or collaboration element we should take into account a more direct link or explanation would be helpful to us.

Many of the figures and some of the tables are low-resolution screenshots which should be improved
The screenshots from tools are helpful but small, given the 2-column format. These should be high resolution to allow the reader to zoom in on the images in the final PDF, but the authors might consider providing a link to a set of slides with larger versions.
We can make high-resolution slides. Any advice on making better screenshots would be welcome!

Strange chars ÔwinningO
Fixed, thanks!

Solicited review by Iyad Rahwan:
I read this paper with great interest. The topic is very timely, since the idea of large-scale argumentation support on the Web has been brewing in a variety of fields (AI, Semantic Web, decision-support, informal logic etc.). There have also been many attempts by developers to build systems to support Web-based debate. But no single authoritative review is available that summarizes what is available. So I thank the authors for taking up this task.
The survey is very comprehensive, covering pretty much any online system or relevant paper I could think of. The authors are to be commended for this effort; they did a great job on breadth.
Having said that, I believe the paper is not yet ready for publication. The main reason is that the survey is not analytical enough. To me, a high-quality survey gives, not only a comprehensive overview of the state-of-the-art, but also critical analysis that brings everything together in an overarching framework, making it possible to identify where the gaps and next major challenges are. While the authors have gone to some effort to provide such critical analysis in some parts (e.g. Table 1), I still think the papers needs to extend this kind critical analysis to other places. Below, I give some comments that shed more light on this issue, and outline some ideas for how to deepen the analysis.

Thank you for this very helpful comment! We have tried to increase the extent of the analysis in several ways, in particular by sections on Requirements and Features of Social Web Tools. We have also taken your advice on restructuring the paper (i.e. moving the tools section to the appendix, treating theoretical models and the applications more uniformly). We hope this improves the quality of the survey and we very much look forward to your further suggestions on any remaining gaps, or further thoughts on how to improve the critical analysis presented.

In section 2, you summarize multiple theoretical models that form a basis for the different technologies out there. You look at IBIS, Toulmin's scheme, and Walton's schemes. However, it would be useful to compare these models, especially in terms of their potential advantages and disadvantages in supporting argumentation on the social Web. For example, Walton's schemes provide a finer grained classification than Toulmin's single schema. Is this good or bad? For what kinds of systems would one system be better than the other? This kind of analysis would provide useful guidelines for evaluating the suitability of these models for different applications.
The same can be said about section 3. Again, what are the pros and cons of these different linguistic approaches to understanding argumentation? Which of these models are useful for what kinds of purposes in social web argumentation? What tradeoffs do they provide? Can we build a system based on multiple such models?

After a combined section on theoretical models, covering the material previously in sections 2 and 3, we have added a comparison of theoretical models, as follows:

> 5. Comparison of Theoretical Models
>
> Any of these models could be expressed in semantic formats (e.g. RDF) since they are compatible with a graph-based representation of argumentation. Yet for modeling argumentation on the Social Semantic Web, it is most meaningful to examine the challenges and opportunities that might advantage any one model or framework over the others.
>
> We can make several distinctions between models, for instance based on the community in which they originated, their purpose or use, the extent to which they focus on disagreement, the unit of analysis on which they focus, their granularity, and their suitability for automation or for aiding human reasoning.
>
> 5.1. Community of Origin
>
> Various communities have contributed models, particularly the argumentation and linguistics communities. The IBIS model comes from management and was later taken up by design rationale and humancomputer interaction (HCI) communities. The Language/Action Perspective originated in artificial intelligence and HCI and was later adopted by communication theorists. In some cases,

models bridge communities: the pragma-dialectic approach is an argumentation model which has been heavily influenced by linguistics, and of the theory of pragmatics [63] in particular. Models have been shaped by their originators and proponents, and the purposes for which they were intended.

5.2. Purpose or Use

The intended purpose for models depends largely on their origin. Models put forth by the argumentation community are generally designed to support either analysis (e.g. to determine the reasoning patterns used and to identify fallacies) or formal reasoning, in order to address questions such as computational decisions of which argument won, what the deciding factors were, or what values and preferences were expressed in the discussion. Models of linguistic features may be used in discourse analysis, for summarization, and to support natural language generation by both machines and non-native speakers. Models from other communities are generally intended to support flow-based process analysis, for instance to organize information in order to avoid information overload, to speed human decision-making, and to provide a record of collaborative thought processes.

5.3. Agreement/Disagreement Focus

Disagreement and the process of coming to consensus are the core of argumentation. While disagreement and agreement are central in models coming from the argumentation community, other models focus on this core to a greater or lesser extent. Most linguistic models are considerably broader and less focused on the argumentation aspects, yet in addressing conversation, they provide valuable insights as well as analysis tools. HCI models focus on supporting collaboration and shared visions; disagreement is analyzed or understood only to the extent necessary for coming to consensus or visualizing viewpoints.

5.4. Unit of Analysis

Different units of analysis have been used. At the language layer, models may focus on the relationship between different clauses (Metadiscourse, Coherence, Cognitive Coherence, RST) or the communicative function of different words, phrases, and sentences (Speech Act Theory and the Language/Action Perspective). The pragma-dialectic approach focuses on the propositional level, while factors analysis looks at important attributes or dimensions. Other models focus on classifying individual arguments and their relation to a whole (IBIS), or studying the internal structure of arguments (Toulmin, Walton, Argumentation Frameworks, Value-based Argumentation Frameworks).

5.5. Granularity

Models of linguistic features are more granular, but sometimes less focused on the overall structure. Coarse-grained and simple models, such as IBIS, more common in application. Yet even IBIS is not generally applied in its full complexity, but is rather reduced to focusing identifying issues, and then on identifying pros and cons for a particular issue. Fuller versions become more complex by looking at the relationships between arguments: what responds to what.

5.6. Ease of Application

Mechanistic application is possible for some models but not for others. In particular, classification for Walton's model would be quite difficult due to the large number (65) of argument categories and the need for detailed reasoning. On the hand, in many cases language technologies can be mechanically analyzed. Identification and classification of argumentation via language technologies is still in its infancy, yet offers great potential to expand algorithmic understanding of language.

5.7. Support for Human Reasoning

To aid human reasoning, however, linguistic models that mainly use cue words are probably too granular since they occur at the sentence level, probably more granular than needed. For this purpose, Walton's critical questions are very useful, because they can point humans to the questions that need to be addressed, opening the door to checklists for reasoning, which could be applied consistently by groups. Value-based frameworks also address the basic reasoning underlying social decisions: each person has their own reasons, which get indicated in discussion. Focusing on what the values are, and being able to articulate them, can help both in developing empathy for dissenting viewpoints, and in making clear the rationale for group decisions when consensus is needed.

In fact, I felt that the separation between sections 2 and 3 is a bit strange. In section 2, you look at theoretical models of what an argument is. It seems to me that coherence (3.1), speech act theory (3.2), the language/action approach (3.3) and rhetorical structure theory (3.4) all provide alternative theoretical models, though perhaps focusing on different levels of abstraction. But don't they belong in section 2 with the other theoretical models?

Thank you. This was a very instructive comment; we have considered these together with the theoretical models in a revised section on Theoretical Models of Argumentation (now section 4).

On the other hand, sections 3.5-3.8 are about computational linguistic methods for supporting argument annotation, discovery, etc. There are also bits and pieces of this in sections 3.1-3.4.

Applications, including computational linguistic approaches, have been moved to section 6, "Applications of the Models to the Social and Semantic Web".

Given all the above, I think it might make more sense to dedicate a section purely to theoretical models (describing them in isolation from their applications). Here, you can talk about IBIS, Toulmin, Walton, speech acts, language/action, coherence, and rhetorical structure theory, all in isolation, and purely as theoretical models for capturing argument structure. This section could include some high-level comparison between these models. Later, when you talk about specific computational models/applications, you start drawing connections to the theoretical models underlying them. (e.g. IBIS RDF is based on IBIS, ArgDF is based on Walton's schemes, and so on). The authors could, of course, find an even better way to do this separation, but it's just one suggestion for making the breakdown more meaningful.

Thank you for this very helpful comment! The new structure, covering first theoretical models, then their comparison, and finally the applications of each model, takes your advice.

Another issue is the separation between sections 4 and 5, which I found a bit unnatural. The authors clarify (in 4.1) that those discussed in section 5 originated in the argumentation community and focus on representing arguments in more detail. To me, it would make more sense to have just one section, and to separate the models, for example, by the underlying theoretical model they use (e.g. Toulmin-based vs. IBIS-based, etc.).

We have combined these sections, and added coverage on community of origin and argumentative focus in the comparison (now section 5).

As mentioned above, Table 1 is very good. But I think it would be good to expand a bit on the text in section 6. It would be useful to explain the table in more detail, explaining what the authors mean by things like polarity, taxonomic, concept vs relation centered, etc.

We introduce the table with a little more description. If further explanation would be helpful, understanding what questions readers are likely to have would be helpful.

Topics addressed include whether each ontology is centered on relations or concepts as well as whether it is IBIS-like (i.e. does it contain concepts functionally equivalent to IBIS' `Statement', `Issue', `Position', and `Argument'?). We also cover what types of relations it contains, drawing from ScholOnto's types: causal, similarity, generic, supporting, challenging, taxonomic (e.g. hierarchical categorization), and problem related. Further, we describe whether polarity (e.g. positive vs. negative) and weights are explicit or implicit and whether the ontology specifies other ontologies to use for content provenance and authorship provenance (such as from FOAF, SIOC, or PAV--the Provenance & Authoring and Versioning ontology and domain knowledge (such as from DOLCE, SKOS, or the PRotein Ontology).

Now, let's move to section 7, in which you provide an extensive description of existing tools. It's clear that the effort that has gone into producing these summaries was enormous. However, the descriptions are a bit monotonous and factual. But I still think it is useful to have. Therefore, I suggest this entire section, together with the matrix comparing them, be moved to an appendix. It would then serve as a reference for people to look up a specific system (much easier than going to the web site and trying to figure out how it works).

We have moved section 7 to an appendix, as you suggest.

Now, to replace section 7 (which I hope gets moved to an appendix), I think there is a room/need for a shorter section that compares ``classes of tools'' more broadly. One way to do this is to describe the general features that these tools must provide. Here's an example of these features (partly based on the comparison matrix), and each of them could serve as a sub-section:

- visualization
- annotation / representation style
- search
- social networking capability

Under each, you can describe a few example systems, and refer the reader to the appendix for more detail. This way, you would engage the reader more, rather than having him/her sift through a description of one system after another, only to provide an analysis of the features briefly at the end.

We have added such a section, in section 9. We cover thirteen particular features of these systems– visualization, ease of use, collaboration, user engagement, balancing contributions, deliberative polling, distributive and federated systems, annotation, incremental formalization, populating knowledge bases from user input, mixed initiative, search, reasoning and querying.

In summary, I think this has the potential to become a great survey, and most of the hard work has been done. It just needs a bit of shuffling around and some high-level contextualization.

MINOR COMMENTS:

The heading of Section 4.1 is unnecessary.

Removed

Page 10, first line of section 4.14, [99] [100] -> [99, 100]

Fixed.

Reference [107] is not published yet, so the year should not be listed.

Fixed, thanks!

The definition of WWAW, quoted from [5] is repeated too many times. Might be a good idea to remove a couple of copies and just keep the reference.

Done, thanks.

Solicited review by Fouad Zablith:
The article provides a survey about the argumentation field, in the context of the Social Semantic Web. The review includes a (a) theoretical overview of existing argumentation models, (b) approaches from the linguistic and communication theory, (c) work based on semantic web models and (d) and tools representing argumentation on the web.
The article gives a very good overview of the argumentation field, with theoretical background as well as applied models/tools. It will serve as a good reference for research in the argumentation field. The coverage of the survey is very good, especially at the level of argumentation tools.
The main issue that the authors should address is the focus of the paper. The focus should be more around the Social Semantic Web theme, and refers back to it whenever possible. There is good analysis performed in some of the sections (I highlight them below), but it would be better to put the aims of the review and motivation in terms of the Social Semantic Web at the introduction level, and use them as reference later in the article. It shows that the authors have made an effort to achieve that, but further work is probably needed. The article contains many key ideas that can potentially relate to social web. I will give some suggestions below.
One way to improve the presentation and analysis is to have a section about the social semantic web, and how the interaction of users around the web has been shifting from closed web systems, towards more open and interlinked social applications.

Then argue how important it would be to capture the arguments of the discussions in such environments, along with the requirements needed to achieve this. The requirements can include: argument representation, elicitation, exchange, mappings, mining from text, authorship provenance, etc. The requirements can be used later in the paper as pointers to show how existing approaches fill such requirements, or fail in doing so.
It is worth having in the introduction some of key references showing that the research in the field of argumentation within the social web is getting more important. Some examples:
a- How Ritter et al. model Twitter conversations (A. Ritter, C. Cherry, and B. Dolan, "Unsupervised modeling of Twitter conversations," in Proceedings of Human Language Technologies: The 11th Annual Conference of the North American Chapter of the Association for Computational Linguistics, 2010)
b- The work done about argument schemes for Amazon reviews (S. Heras, K. Atkinson, V. Botti, F. Grasso, V. Juliana, and P. McBurney, "How argumentation can enhance dialogues in social networks," in Computational Models of Argument -Proceedings of COMMA 2010, no. 216 in Frontiers in Artificial Intelligence and Applications, pp. 267–274, IOS Press, 2010.)
Thanks, this is a very helpful suggestion. We have added further introductory material about the Social Semantic Web, arguing as you suggest:

> The interaction of users around the Web has been shifting from individual siloed Web systems, towards more open and interlinked social applications1. In discussion environments, such interlinkage is particularly important: the same community may discuss topics across multiple sites, and use multiple types of sites, such as blogs and microblogs, discussion forums, and wikis. Crosslinking the discussions of these systems is a first step, which has been taken by SIOC – Semantically-Interlinked Online Communities [24]. Yet the internal structure of these discussions – such as whether the participants agree or disagree, are contributing diverse ideas, or debating in circles – is still not represented in SIOC. Capturing such underlying arguments would be valuable, and research is beginning to address this for instance by identifying argument schemes used in Amazon reviews [25] and by modeling the speech acts in Twitter conversations [26]. Yet infrastructure for argumentation on the Social Semantic Web is still needed.

This helps in motivating the article and review domain.

Further, we have added a section about requirements, as follows:

> What are the requirements for supporting argumentation on the Social Semantic Web? Arguments must be identified, resolved, represented and stored, queried, and presented to users. Identification involves mining arguments, in the form of claims, from text (Section 6.11.2, page 15), eliciting

> them from users, or some combination of these approaches. Resolving involves indicating the relationships between the individual claims that make up arguments: are they on the same topic? Do they agree or disagree? Representing and Storing arguments uses a suitable ontology to represent claims and the relationships between them. This supports Querying and enables Presenting the Social Semantic Argument Web, i.e. using these ontologies to facilitate access to conversations, summarizing the contentious and agreed-upon points of a discussion.
>
> The representations chosen are key to this process, since they determine what stored information can be retrieved, and what information needs to be mined and resolved. Existing representations will need to be augmented, since the information we can retrieve depends on what information we store. The desired ontologies should encompass not only the structural features of posts (such as the date and author of a post) and of conversations (such as the reply structure of multiple posts), but also additional argumentative features, for instance to mark claims and to indicate the relationships between them. The simplest relationships for representing argumentation indicate whether pairs of claims support or challenge each other. Yet in general, these relationships do not just pertain to pairs: in general, entire groups of arguments may need to be considered together.
>
> Even simple scenarios may give rise to complex argumentation involving chains of statements, and context-dependent relationships in which the conclusion of one argument is premise of another [27]: this makes the graph structures of the Semantic Web a natural fit. Wyner et al. suggest that besides agreement and disagreement, the semantic types of arguments should at least include introduction of a premise or exception, refinement, and pronomial anaphora and call for a modular architecture "where different relationships or debate components may be added systematically" [27].

- An introduction for Section 2 is needed. It could answer questions e.g. why are theoretical models of argumentation important?
We hope that this point is made when we discuss the representations: "The representations chosen are key to this process, since they determine what stored information can be retrieved, and what information needs to be mined and resolved."

Worth mentioning that various approaches draw on Toulmin's work to model computer-based argument structures.

We have added an applications section, in which we mention several computer-based systems:

> Toulmin is cited frequently and in numerous fields, from rhetoric (e.g. [64]) to education (e.g. [65]) to computer argumentation (e.g. [66]). While his model is a useful abstraction, scholars have argued about whether people actually think in terms of Toulmin's warrants [67]. One early hypertext system, SEPIA, drew from the Toulmin system [68]. In the Semantic Web, the Toulmin Argument Model is implemented by an OWL 2 DL ontology that imports CiTO6 [69]. It follows Toulmin's model closely, as shown in Figure 7, page 11.

Toulmin has certainly been influential in computational argumentation systems. Are there other systems you would suggest mentioning here?
Also that IBIS influenced several ontologies (it's good to see how the last paragraph of Section 2.1 connects to other parts of the paper, worth doing the same for later sections when appropriate).

- It sounds more natural to swap the order of section 2.1 and 2.2. As section 2.2 gives the kind of starting point and origins of the interest in argumentation, and how Toulmin's work fed into knowledge systems.

Toulmin is now covered before IBIS, thanks.

- Section 2.3 last paragraph: "For our purposes, "the Walton model" is that a dialogical argument uses one or more dialogue types and one or more argument schemes and has an opening, a middle (argumentation) phase, and a closing." More clarification is needed. What are you achieving through your choice?
This is no longer relevant and has been removed.

At this level, you also talk about relevance, cooperativeness and informativeness. This sounds relevant to the social web, and might be worth to elaborate a bit more on this?
This is Grice's model, now discussed in the expanded section on the pragma-dialectic model:
The pragma-dialectic approach also stresses the principles of clarity, honesty, efficiency, and relevance, updating Grice's [62] Cooperation Principle–which focuses on the intention of language–with the Searlean focus on the communicative aspects of language use. Relevance, for example, can be global, local, subject matter-specific, or probative. An argument may be relevant at one phase, but irrelevant at another point; for example an argument related to selecting the topic of discussion is not relevant once the topic has been agreed upon.

- Section 3, Introduction: "Approaches from linguistics and communication theory are relevant to argumentation in at least two ways." True. What is the impact on social web? E.g. generation of specific ontologies? As you mention that such approaches help in detecting relationships between texts, can you relate it to the social web? (Maybe inferring relationships between people? discussions?...)
Per a reviewer suggestion, approaches from linguistics and communication theory have been combined with other theoretical approaches, hence this introduction has been removed.

In general, these approaches are useful in determining computational linguistics approaches for extracting argumentation from the social web, which is the feasible way to create a coarse information structure from discussions.

- Section 3.3: "model online conversations to classify them and create visual maps, used for information retrieval." Worth relating to the social web.
We now have a section on visualization, discussing various social web tools, to address this:

> Visual representations aid understanding. Here we point out visualization features of some Social Web argumentation tools, along with screenshots; further details are available in the appendix. Argument maps are one classic representation, which continues to be popular with a variety of tools, including Argunet, Cohere, and Climate CoLab.
>
> On Argunet, users have significant control over the presentation of arguments, such as colors and descriptions of different argument families. Related maps can be published in series, as shown in Figure 15(a). In the argument map representation, each node can be opened up to reveal a matrix listing which other arguments support, attack, are supported by, and are attacked by the given node (Figure 15(b)).
>
> In Argumentum arguments are colored to indicate the supporting (green) and opposing (red) arguments (Figure 16). Comments, but not their replies, are similarly colored to indicate agreement or disagreement. Pro and con arguments are distinguished by green and red lines to the left of a comment, posted linearly, rather than in two columns.
>
> Competing Hypotheses supports breaking down information into hypotheses, evidence, and analysis, which are entered into a matrix as shown in Figure 36(a) on page 39. The matrix can help visually indicate the most likely and least likely scenarios. Multiple analyses can be combined to provide a group view (Figure 36(b) on page 39), or compared pairwise.
>
> ConsiderIt [131] powers the Living Voters' Guide. What is unique is the possibility to drill down to understand other voters' perspectives. In addition to seeing pros and cons on an issue from all voters, regardless of their stance, (Figure 18(a) on the following page), the Living Voters' Guide can show the key points for a particular group of voters (Figure 18(b) on the next page), such as those undecided on the issue or strongly supporting it. This can help users understand what makes

an issue controversial. Users indicate how they feel about an issue before and after reading an argument (deliberative polling), which could also be used to find the most convincing arguments.

CreateDebate (Figure 19 on the following page) offers numerous statistics for each debate, such as the language grade level, average word lengths, and vocabulary overlap, as well as a wordcloud. Some debates have more than two sides.

In Opinion Space [132], opinions are mapped in a constellation, using principal component analysis, to show a user where they stand compared to other respondents, as shown in Figure 20 on the next page. Each point in the visualization represents a perspective; larger points represent more popular perspectives.

SEAS [133,134] structures arguments as templates, showing a colored tree view (Figure 21 on page 23). SEAS visualization features are also considerable: to visualize multiple dimensions, SEAS uses starburst, constellation, and table views.

- Section 3.4: The idea of nucleus and satellite spans of text, sounds important as well to the context of the paper, might be worth highlighting it? For example it could be a potential analysis of arguments running over tweets, what type of diversions might results out of core conversations, etc...
This is Rhetorical Structure Theory, now covered more fully:

Rhetorical Structure Theory (RST) [40], a method for analyzing texts according to their structure and rhetorical role, was developed at the University of Southern California's Information Sciences Institute to assist with computer-based text generation. In RST, structures such as 'Concession', 'Evidence', and 'Justify', called 'relations', describe the relationship of two or more spans of text. Generally one span (the most important) is called the nucleus, while the less important spans are known as satellites. In some situations (such as sequences and contrasts), both spans are nuclei of equal weight. Justifications and hedges are more likely to appear in satellites while the nucleus is more likely to contain claims; this has potential application in detecting arguments and in summarizing social web applications.

And later, in the applications section:

RST has been widely used for a variety of purposes and in 2006 a paper summarizing its applications [96] was published. Recently, Mentis et al. [97] used RST to analyze group decision rationale, comparing new and established groups using relations such as 'Interpretation & Evaluation', 'Evidence', 'Elaboration', 'Concession', and 'Antithesis'. Summarization research has frequently drawn upon RST [98,99].

- Section 4.10, last paragraph: This is good! More of such arguments would make the paper even more interesting.
- Section 4: What are your main conclusions?
These are discussed in the comparison section now:

Some models provide a shallow view of arguments yet are situated within a larger (perhaps social) context. Yet other models, originating in the argumentation community, focus on representing the arguments themselves, often including the internal structure of the arguments. The argumentation community's interest in the Semantic Web has been motivated in part by the idea of The World Wide Argument Web (WWAW) [5], while the semantic web community's interest has centered on communication structures, rather than the details of argumentation or rhetoric.

- Section 5.3: given that your main introduction and motivation starts with the WWAW, and about the need of having large scale argumentation systems, would you give the Argument Interchange Format (used in WWAW), a better edge over the other described formats to serve the purposes of the social web context? More reflections on the social aspect could be useful.
AIF is mainly useful when there are argument schemes connecting statements; yet there is currently no way to derive these from the social web. So AIF will mainly be of use once argumentation mining has developed substantially. As we have explained:

AIF would be challenging to apply to the Social Web because it requires argumentation schemes to be specified. In fact, even arguments themselves are not necessarily clearly specified in the informal argumentation found in the Social Web! Thus, for example, enthymemes make formal specification of arguments challenging.

- Section 6: Again it would be easier to have a list of requirements in order to map and support your choice of the table 1 criteria.

We have added a Requirements section, with examples, in section 3.

- Section 7.2: Here you are talking about the scope of the tools, which is good to push as well to the introduction level, and make it clear in the scope of the whole paper.

The tools have been moved to an appendix so we haven't done moved the scope to the introduction level so far.

- Section 8, before last paragraph: "To understand their current integration with the Social Web, we record whether they use a site-specific login, or allow external credentials (such as OpenID, Twitter, or Facebook). We further..." Here you listing some of the features you are interested in for the social context. Worth adding it to the top of the paper as well, and list it as part of your requirements.

Since the tools summary is relegated to the appendix, we've left this information in place there. We'd welcome suggestions on how to weave more of this into the introduction.

- Section 9.3: needs refinement, also consider concluding the paper on the 3 interesting main conclusions presented in Section 9.2, which are probably more valuable than the categories of the argumentation tools.

We have removed the categories.

Typos and other fixes:

- Some figures are not referenced in the text (mentioned below).

Consider dropping some screenshots, if there's not much to say about.

We should now have referenced all figures. The screenshots are critical; if we have left out any references, erroneously, that would be useful to know. These tools are short-lived and change, hence understanding them in the future will require these visual aids.

- Abstract: Last sentence too long to parse.

Revised to "Finally we end with Social Web tools for argumentation, including online applications combining Web 2.0 and Semantic Web technologies, following the path to a global World Wide Argument Web."

- Section 1, paragraph 2, line 6: farflung --> far-flung

Fixed

- Section 1, paragraph 5, line 1: "Yet, Social Web does not yet have widely-used argumentative ontologies" --> "Moreover, Social Web does not yet have widely-used argumentative ontologies" ?

Fixed

- Section 1, last paragraph, line 4 from bottom: "In we compare these..." --> "In § 6 we compare these..."

Fixed

- Section 4.7, line 1: DILGENT --> DILIGENT

Fixed

- Section 4.11, paragraph 2, line 1: Figure 4.11 --> Figure 7?

Fixed

- Section 4.11, paragraph 2, line 7: "Tools using SWAN-SIOC include as PDOnline (§7.32)" --> "Tools using SWAN-SIOC include PDOnline (§7.32)"

Thanks! Fixed

- Figure 6 not referenced in text?

Fixed

- Section 4.14: Figure 4.14 --> Figure 8?

Fixed

- Section 5.1 and 7.1: are the only introductory sections with title, either add titles to all other intro sections, or remove these two.

Removed, these weren't needed, thanks!

- Section 6, line 3: "Topics addressed include are whether each ontology is centered on relations or concepts and whether it is IBIS-like (contains concepts functionally equivalent to IBIS' 'Statement', 'Issue', 'Position', and 'Argument')" Needs rephrasing
Fixed
- Section 7.1, paragraph 4, line 1: "This tools coverage in this paper differs..." --> "The tools coverage in this section differs..."?
Fixed
- Table 1: Some columns can be made narrower for table to fit in the page.
Tables have been entirely reworked.
- Section 7.5, line 3: ArgDB --> ArgDF?
Fixed
- Figure 11 not referenced in text?
Fixed
- Some of the referenced figures appear very far from the reference in text. Some figures can be made smaller to fit in one column, and appear after the reference?
We have tried to balance visibility with location. Please let us know if there are any particular figures that still seem too large.
- Figure 13 not referenced in text?
Fixed
- Section 7.11, line 10: Avcienna --> Avicenna
Fixed
- Figure 19 not referenced in text?
Fixed
- Section 7.18, line 9: Figure 7.18 --> Figure 7.23?
Fixed
- Section 7.21, paragraph 1, line 3 from bottom: [(1)] unclear if this is a reference?
Removed—that was an extraneous LaTeX command. Thanks for spotting it!
- Section 7.21, paragraph 2, line 6: "for for people" --> "for people"
Fixed
- Section 7.24, line 3: iDebate. Please add reference
We have reworded to make it clear that this is the International Debate Education Association
- Section 7.24, line 5: Debateabase. Please add reference
We have added the URL http://www.idebate.org/debatabase/intro.php
- Figure 28 not referenced in text?
Fixed, thanks!
- Section 7.26, line 4: "populated by hand-annotation by activists". Please rephrase.
Rephrased to: " This database was created by asking activists (who are interested in informing or convincing others) to indicate disputed claims manually, and then extended algorithmically."
- Section 7.28, line 3: "in Figure 31 A tree view..." --> "in Figure 31. A tree view..."
Fixed
- Figures 30 and 31 appear after figure 33 in text. Why not shrink them and put them within the columns?
Unfortunately if these are single column, it requires about a 50% further reduction, which makes the tables unreadable (at least for my eyes). However, to alleviate the bad ordering, I have discovered the stfloats package. Please let me know if you notice other figures that are still out of order; I believe this has rectified that problem.
- Section 7.30, last line: "Google Ware discussion bot Arvina show". Reference needed. [145]?
Added. This is Mark Snaith's work.
- Section 7.32, last line: "it is unique it that it uses scientific argumentation" --> Please fix
Fixed
- Figure 36 not referenced in text
Fixed
- Figure 7.38, Line 3 from bottom: Figure 39(a) --> Figure 39(b)?
Thanks for noticing this! Fixed.
- Table 3: Add label.
Added, thanks.

- Table 3: Funnelling --> Funneling (as used in the text)
Fixed, thanks!
- Section 9.3, line 12: "ÔwinningÕ", character encoding
Fixed
- Section 9.3, paragraph 2, line 2: "peoplesÕ", character encoding
Fixed