

# The Deliberative E-Rulemaking Project (DeER): Improving Federal Agency Rulemaking Via Natural Language Processing and Citizen Dialogue

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## ABSTRACT

Many scholars believe that electronic rulemaking has great but largely untapped potential to expand the public's democratic input and improve federal agency regulatory rules. The existing federal rulemaking process, however, elicits many redundant and poorly considered comments, and some participants challenge the legitimacy of agency rulemaking decisions. This Deliberative E-Rulemaking (DeER) project tests the application of Natural Language Processing (NLP) technologies and public deliberation techniques to improve the quality and organization of public comments and the legitimacy of the federal rulemaking process. This paper describes the goals, innovations, research design, technology, and preliminary results of the DeER project. The social science herein advances research on measuring the quality of public deliberation, the effects of deliberation on individuals and communities, and the emergence of distributed intelligence in networked decision making groups.

## Categories and Subject Descriptors

K.4.0 [Computers and Society: General]

## General Terms

Management, Performance, Experimentation, Human Factors.

## Keywords

Rulemaking, E-Rulemaking, Natural Language Processing, Interactive Question Answer, Dialogue Analysis, Summarization, Democratic Deliberation, Deliberation Quality, Multi-Level Deliberation, Distributed Intelligence, Citizenship

## 1. Goals and Innovations

The primary objective of this project is to expand the value and legitimacy of electronic rulemaking while using this practical context to advance Natural Language Processing (NLP) and the social science of deliberative groups. By leveraging both NLP and a networked deliberation technique called Multi-Level Deliberation (MLD), DeER seeks to address several key problems relating to e-rulemaking, including: 1) problems of scale such as output volume and information sharing across large numbers of participants and 2) poorly informed and unsophisticated participants who fail to share unique information and engage in polarized discourse.

Our objective for the NLP component of the project is to combine such NLP technologies as Interactive Question Answering (QA), Dialogue Analysis, and Summarization into a viable learning and discussion facilitation agent called the Discussion Facilitation Agent (DiFA), which will try to keep users informed, on the fly, about changes and developments in the deliberation content, and summarize key arguments at the conclusion. A second and complementary key component of this effort will be Multi-Level Deliberation (MLD). In such deliberation, small groups will discuss the rulemaking topic and then, through proportional representation voting, select two members that will represent the group in a higher-level group that represents multiple lower-level groups. Thousands of participants can be represented in a few levels. More informed and engaged participants and better ideas should flow toward higher-level groups. Information can also flow back to participants, potentially increasing the legitimacy of final agency decisions. Agency officials can directly interact with the few participants in the highest-level groups. Interactions between groups and group members can promote the emergence of distributed intelligence.

## 2. Research Design

The project will involve four phases of experimental research. The first two phases test the NLP technologies and social science measurement approaches on samples of 80 to 100 college students. The last two phases will involve large samples of actual public participants in agency rulemakings. We are working with agency officials to involve these officials in interactions with our participants and to apply participant comments and summary documents to the official public record of rulemaking comments.

The final 3X2 experiment crosses MLD, non-MLD deliberation, and standard, non-deliberative rulemaking participation with the presence or absence of DiFA. The success of the various conditions of these experiments will be determined using survey and focus group measures of agency official and participant perceptions and evaluations; a content analysis measure of the cognitive sophistication of comments; both human-coded and automated content analyses of the quality of deliberation; measures of the impact of the deliberations on participants, including knowledge, trust, citizenship, and communicative rationality; perceptions of the legitimacy of decisions; DiFA usage patterns; and continued participation.

### 3.Key Technology

In the initial phases, we concentrate on NLP technologies that can inform users before and during their deliberation regarding their deliberation topic. We have integrated a discussion board mechanism, the discussion module of the Drupal content management system, with our existing Interactive QA system, HITIQA. The HITIQA system allows users to ask unconstrained natural language questions over a data space and returns short snippets or paragraphs in which the answer can be found. For example, the question "Why is net neutrality important?" returns a first paragraph that contains the following:

*"When asked how important a 'Consumer Bill of Rights' would be that prevented Internet Service Providers from blocking or degrading access to Internet sites and services, 78 percent indicated that such a bill would be important, with 59 percent of that group calling it 'very important.' The poll did not differentiate this "bill of rights" from net neutrality, but its findings make it clear that protecting the integrity of the Internet is indeed important to Americans, regardless of terminology."*

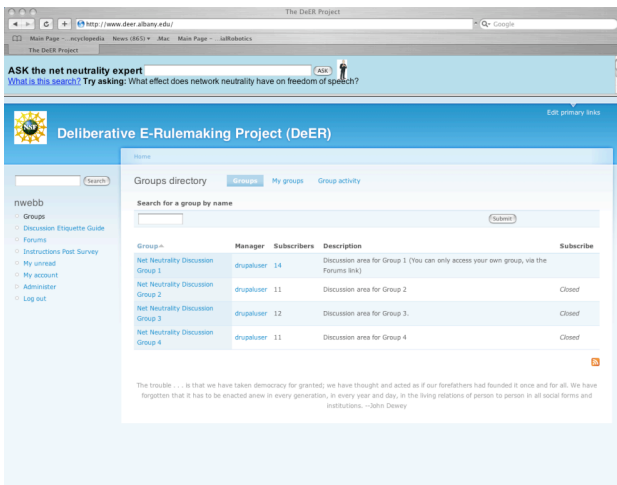


Figure 1: Screenshot of the DeER system

We mined the World Wide Web for data applicable to our first deliberation topic – Network Neutrality. We initially mined around 3.4Gb of data, which was then reduced, by removing duplicate material and HTML tags from the remainder, to leave around 500Mb of final data. This data was further processed using a pipeline of NLP applications – including tokenization, part-of-speech tagging, parsing, and Named Entity extraction. Finally, this data is “framed” – a vital process in HITIQA that enables us to capture some of the semantic meaning underlying passages in text. Framing is a process of relating entities in a paragraph to each other using course-grained semantic categories, such as transfer or develop, as well as a general frame, typed by the principle verb.

User are given instruction that this search, labeled "ASK the net neutrality expert" in Figure 1, is different than standard WWW search paradigms, but are not given explicit instructions in

how to use the search, as this facet is partly what we wish to observe in phase 1 of our trails.

### 4.Future Work

Another key aim of the first phase is to acquire significant textual deliberation data, threads of written text, in which participants outline key arguments, make counterpoints, and give examples – discovered through interactive searches at the DeER deliberation site. The next phase of processing is to analyze this data, using proven Dialogue Act Analysis techniques to automatically annotate the data with dialogue acts – labels that represent the meaning of the current utterance in context, such as a statement, question or clarification. We intend to use such DA markings to provide feedback on the quality of discussion as determined by a tested deliberative quality content coding scheme. This scheme reliably indicates the amount of agreement, disagreement, elaboration, and so forth present in a conversation. The DA analysis would also be used to identify potential paths of discussion to be presented as exemplars for other discussion groups.

### 5.ACKNOWLEDGMENTS

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