Need Driven Prototype Design
for a Policy Modeling Authoring Interface

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Abstract. This work reflects upon the design stages of a web prototype for creating policy models and policy domains. The approach allows for user input on policy modeling, creating domains and producing relations between entities, arguments, etc. The data collected during need finding provided insight into the type of interaction required for that. This paper reports on the need-finding methodology and the several iterative interaction modeling steps in order to produce a visualized authoring design.

Keywords: policymaking, social network information, interaction design.

1   Introduction

The ever-increasing computational power and the adoption of modern software frameworks have driven the development of more and more impressive user interface designs for various complex requirements. Successful approaches formulate the design around the total functionality and user experience for their target users.

However, visualizing complex data on any level (quantitative, qualitative, semantic, etc.) is not a trivial task. Identifying correctly what the users really need from an interface can make a huge difference between success and failure of the design. User centered design (UCD) methods are focused on research of human aspects of the interaction with objects and contexts. It can be applied from the early stages of development, also in parallel or in synergy with other engineering oriented approaches [1].

Needfinding is a key concept in UCD that elevates the user to the center of the development [2]. During this process, the key users of the application are identified and the needs and emotions that drive their actions are discovered. Several valuable tools can be used for finding the user needs like surveys, interviews, participant observation, diaries, experience sampling etc.

This work reports on the results of the needfinding process for the policy modeling authoring interface and the information that was used for the user driven design. Authors, may them be policy makers or scientific scholars, collaboratively create

domains and policies, ultimately providing formulated sources for social web driven policy argumentation. A major finding was that among all the proposed approaches to the users, the graph-based visual option was fully matched to the user needs, by monitoring the interaction rather than the aesthetics. The introduction of that option was driven by the needfinding results and was validated by usability experimentation.

The next sections describe the environment, the considerations and setup, the usability testing methodology and the results from the user feedback.

2   The NOMAD Policy Modeling Environment

For the purposes of the NOMAD[1] project, the Hellenic Parliament, as one of the main users, has created a basic policy cycle model as described in Fig. 1:
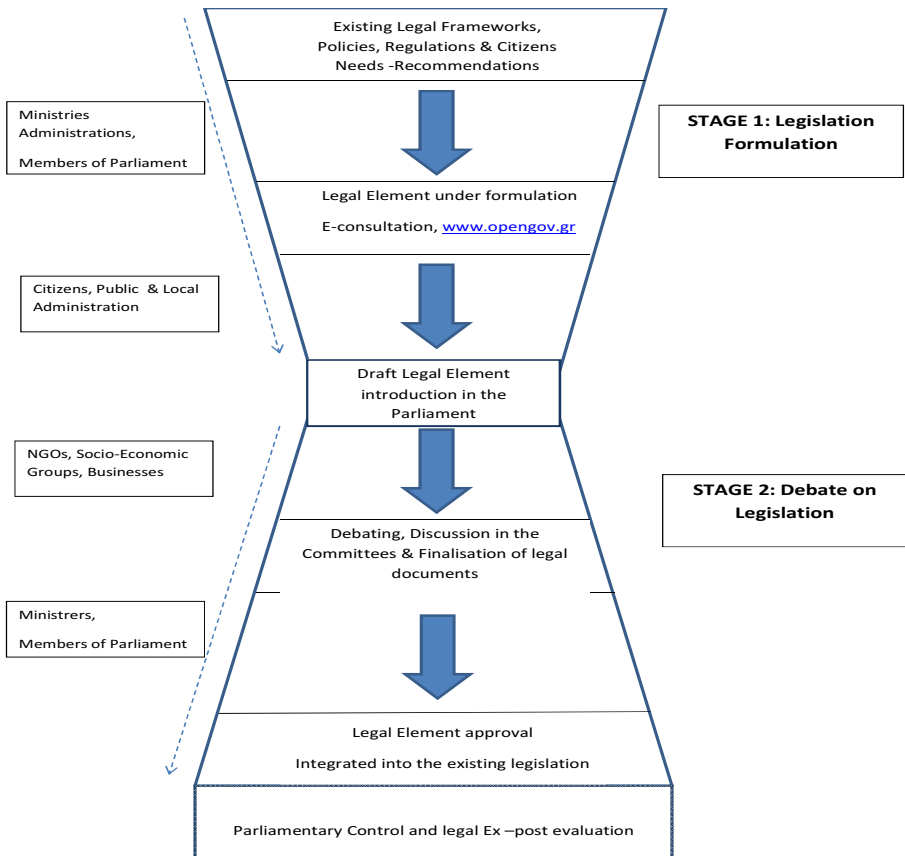

Fig. 1. The generic policy making process (Hellenic Parliament)

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[1] NOMAD – Policy formulation and validation through non-moderated crowdsourcing.

Based on the above, a basic sketch of the NOMAD policy modeling environment functionalities was designed. Main potential functionalities that would be verified by the users included: web and social media crawling, opinion mining, argument extraction, advanced visualization, policy domain authoring, as summarized in Fig. 2.
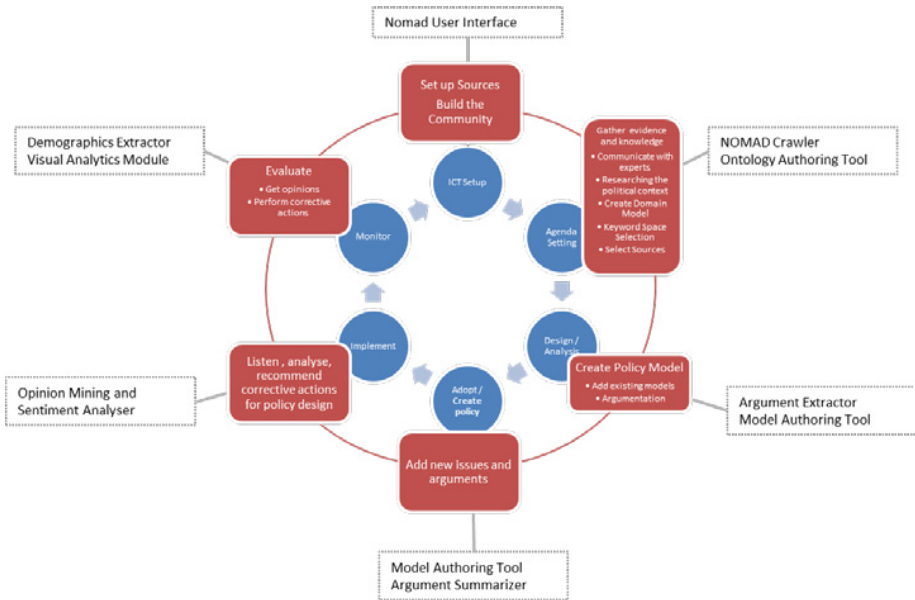

Fig. 2. The NOMAD policy modeling environment overview

The latter was the main focus of the work presented in this paper. The policy maker would use the authoring tool to create generic policy domains and specific policy models. The models would be parsed and fed to the crawlers for document collection and subsequent analyses.

3 Considerations and Set Up

As part of the iterative design, a main task for a successful design was to include the usability testing of concepts and prototypes in all development stages [3]. The needfinding methodology utilized surveys, interviews and participant observation, complying with the basic principles described in the bibliography. Initially, carefully structured questionnaires were sent to a number of NOMAD's authoring tool future users, like domain experts, policy makers, political analysts, journalist etc. This way a data set from a large user sample providing initial information about what the users do, need and think about domains and policy formulation was collected.

The analysis of the data was used to identify the extreme, leading and generally most representative users of the NOMAD authoring interface. These users were asked for observation permission while they used similar tools and methods to create their

domains and policies. This enabled the design team to cross check what the users reported they needed with what they really needed. Video and audio recordings during these observations helped the design team to better grasp the user's emotions, ideas and way of doing things.

After the participant observation, the questions asked during the surveys were refined and enriched in order to target more specific topics, as those would be derived from the observation phase. These questions were included in the interviewing of the representative users again in their own environment. Storyboard of the proposed interaction was shown to the user groups in order to detect false/additional needs and keep users and design team on the same page.

4   Usability Testing Methodology

Based on high fidelity interactive mockups with samples of real data, short usability evaluation sessions were arranged. The purpose was to evaluate the newly introduced visual interaction approaches through the target users that never used such approach before.
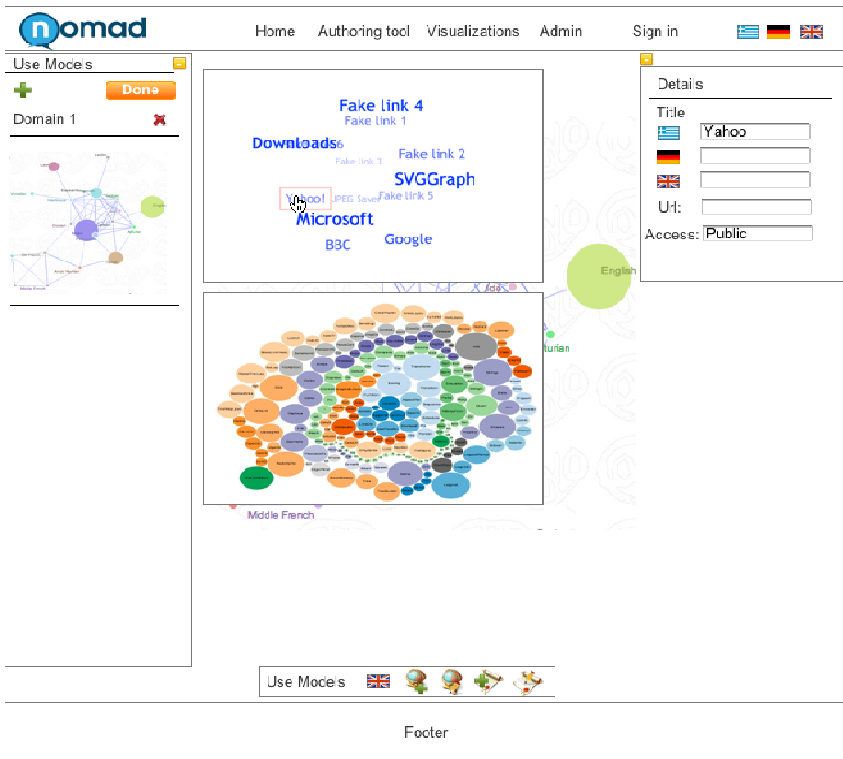

Fig. 3. Mockup derived from the paper prototype of the policy modeling authoring UI

The policy and domain author intentions were modeled into the design and the semantic aspects of creating relational domains were integrated on the interaction level. The aim of the experiments was the validation of the modeled interaction and the specification formulation for the optimal user experience. The results led to design of the paper prototypes and generic mockups of the selected approach for the design of the interface (Fig. 3).

Creating the environment for the understanding of the user needs for a novel approach on policy modeling presented certain challenges. The target users, at the end of the day, would be asked to use state of the art tools and research output on real policy domains. The user interface would be the means for setting up, visually, a policy model that would, at a later time, return opinions and specific arguments about the entities of the policy from the web and social media networks. Metadata such as positive and negative opinions, summarization, aggregated concepts, as well as new data such as extracted arguments would be attached to the policy model, complicating the view and necessitating a potentially high difficulty to navigate the models, even for expert users.

Due to the above, the paper prototypes would have to be clearly broken down to task-driven example sections in order to successfully collect meaningful feedback from the users. More elaborate mockups would be used to address questions and needs on the concept level by asking the users to list their interaction needs and exemplify scenarios of use that would be used to refine the mockups.

5   User Feedback

Two focus group meetings and a broad pilot workshop were organized in order to collect the required subjective user feedback. A total of 50 participants, associated with the Hellenic Parliament (Members of the Parliament, Political Parties, Policy Advisors, Scientific Associates, Prime Minister Office Representatives, Parliamentary Officials, Governmental Officials NGOs and policy researchers) participated in all three sessions.

In the beginning of each session, a live demonstration of the provided tools, the NOMAD Authoring Tool and the NOMAD Visualization, took place. A subgroup of the participants tried the platform live, under the observation of facilitators who were there to support the user throughout the process, in solving the tasks, to record the comments and address any interaction issues. A questionnaire was distributed to the audience, which was filled by them online after the exercise.

Throughout the whole duration of the sessions, fruitful discussions were carried out between the members of the consortium and the potential users. The main findings are provided below:

Crawled Sources. An issue was raised about the sources where the search is performed. Participants were interested in what kind of sources was crawled. Taxonomy of sources seemed to be essential. They highlighted their need to see from which sources the results come in order to assess the reliability of sources. In addition, they would like to isolate the results from specific sources. They also asked

for the capability to get views on the initial content, by visiting the specific source form where it comes, even if the sources are numerous.

Arguments. Specific users would like to see particular arguments in relation to their source (in case the data of the person, who submitted it, is public). It would be also valuable for potential users to see the intensity of the argument per person (how many times the same person expresses the same arguments) or how many people support the same argument.

Structure. Another question was about the hierarchical structure inserted through the domain model and the way the search is performed. There was a kind of confusion concerning the hierarchical structure usage of the domain model, that is how does it help in the search function? Does it narrow or widen the results? Does the number of results depend of the extent of the model? For example, are the results affected based on how much entities/keywords are inserted? Inevitably the authoring environment should be able to correlate the domain, the policies, the sub-policies, the entities, the norms and the arguments with the results after the crawling process and document them.

Reliability. Participants were skeptical about the reliability of the demographic information, since they considered that Internet users conceal their personal details (age, gender, etc.) or declare false information. Thus, they wondered in what extent the sample of the results was representative and reliable. Moreover, a question was made on how privacy and personal data are protected. It was explained by the facilitators that the NOMAD engine processes only the information that is publicly available. Therefore, the demographic information presented depended on that.

Policymaking. A long discussion was raised among the participants on whether the NOMAD tools can be used to provide evidence for supporting an MP's position (on a draft bill, on an existing legislation act, a policy proposal, etc.) in the Parliament. For that, NOMAD results were compared - as case study - to the survey results provided by a polling company. This comparison revealed various opinions, for example some believe that public sentiment is not expressed in surveys or focus groups, which are also very cost inefficient. Others believe that a policy maker can use any or none of the above techniques to present evidence no matter which source they come from. It was generally concluded that any available tool can be beneficial depending on how it is utilized by its users and thus the most important part was how the particular parliamentary teams exploited the respective outcomes.

It was highlighted that NOMAD addressed the user needs' to enable them to get a glimpse onto the needs of the society, thus they are deemed responsible for the interpretation of results. The participants asked several times about the credibility and reliability of the project results and how the policy makers could use them accordingly. It seemed that the visualization tool should be more adaptable to policy maker questions and feed the authoring tool.

As a consequence of the above discussion, a question arose about whether NOMAD is a tool for monitoring and/or adapting the desired policies or it could potentially go a lot further by enabling the creation of new policies.

It was generally observed that the users couldn't fully understand the workflow of the whole process. In fact, it was highlighted from one user that as the interface targets experienced users with ICT background better than traditional policy makers. This was interpreted into two different suggestions:

1. The need for an introductory tutorial or wizard presenting in an easy-to-understand way the whole user interaction with the UI, following a step-by-step interaction for creating/selecting a policy domain to visualizing the results of the analyses.
2. An intuitive way for constructing policy models visually.

Sentiment Analysis. Another subject of discussion was the way the sentiment analysis is performed and why a statement is characterized as positive/negative/ neutral. The participants asked if any other social media information was taken into account for the arguments/entities intensity, for example shares or likes from the social media networks, re-tweets, and so on. It was also discussed whether such information would be of added value to the policy makers.

6   Conclusion

This work reported on the study on needfinding and usability testing of a user interface for collaborative policy formulation. The task complexity required extensive needfinding procedures and more than two iterations of design prototyping in order to ensure the high usability of the proposed visually driven policy modeling authoring process.

The hardest challenge was to derive interaction scenarios from users that lacked the expertise and scientific background to utilize the deeper linguistic concepts of the content. This was a first try on creating a policy-modeling environment for users who traditionally use other means for collecting information.

Future work includes the implementation, testing and piloting of the proposed approach and the evaluation of the interaction model by expert users.

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