

Public Policy Modeling using the DataTags Toolset

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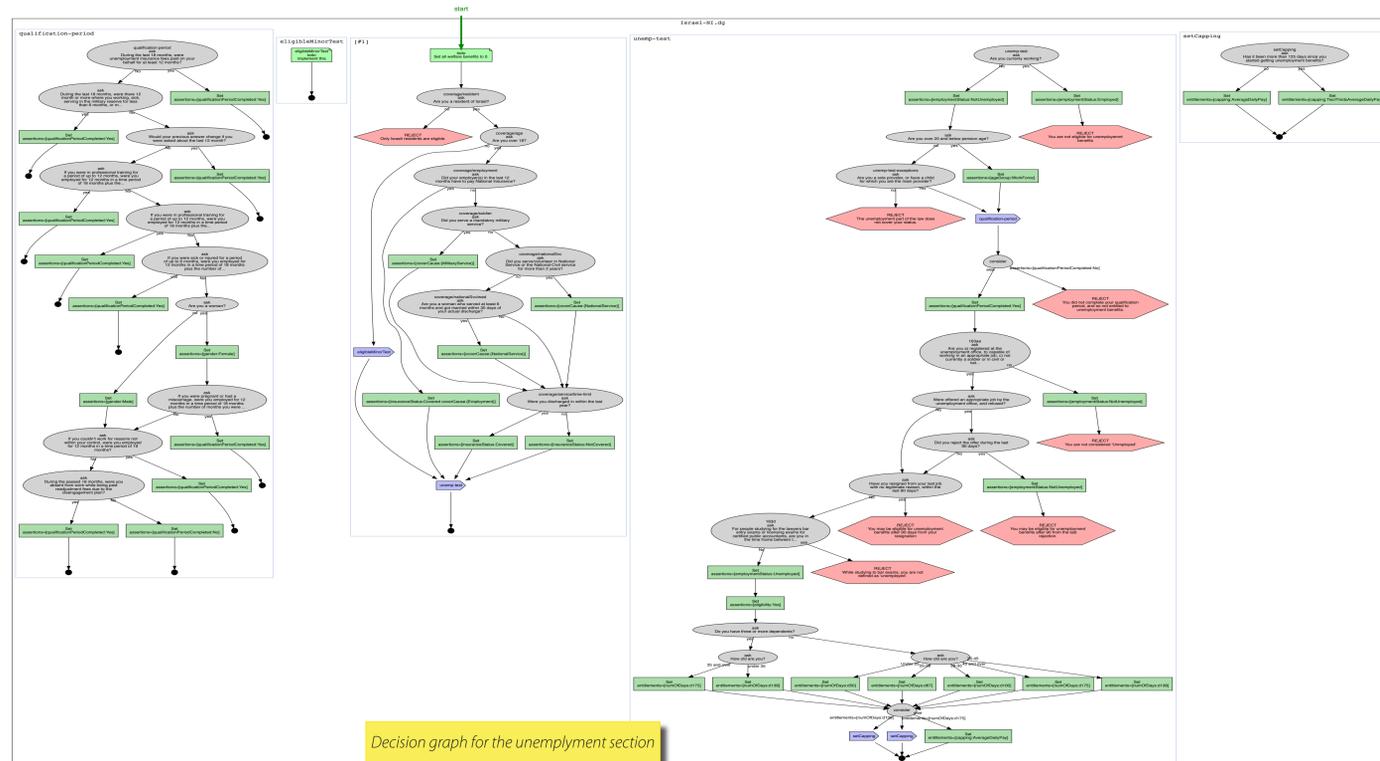
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Background

The task of policy analysts in a welfare state is to identify how fiscal and regulatory instruments are designing the welfare regime [1]. Thus, public policy scholars and practitioners are constantly investigating and improving the workings of public policies. They improve to process of creating such policies, examine how a given policy addresses various cases, and help insured people through the process of Naming, Blaming, and Claiming. This proof-of-concept shows how a formal model of a policy helps address these challenges. We use DataTags (datatags.org), a tool originally used for describing privacy and data handling policies [2], as a modeling tool for the unemployment benefits of the Israeli National Insurance law. The mathematical concept and tool set behind DataTags models are described in [3].

Method

We created a Tags policy model for the unemployment chapter of the Israeli National Insurance Law. DataTags policy models are composed of two components: (1) policy space, an n-dimensional ordinal space describing all possible treatments of a specific case under the modeled policy; and (2) a decision graph, which describes a decision process for selecting a specific treatment for a specific case. The decision graph does not aim to replace human judgment with algorithmic decision making. Rather, it lists the possible answers a human can give for certain questions, and the implications these answers will have under the modeled law. Reading the articles and using Kol-Zchut (www.kolzchut.org.il) as an additional reference, we constructed the two parts of the model in parallel. The decision graph is phrased a questionnaire for a person, either a claimant or a practitioner, going through the process of naming the insured situation.



Decision graph for the unemployment section of the Israeli National Insurance law. Above: visualization. Below: code

```
62 *****
63 >unemp-test< ask:
64 {text: Are you currently working?}
65 {terms: {
66   unemployed: Does not get any salary from anyone, and not self-employed.
67 }}
68 {answers:
69   {yes: [set: employmentStatus=Employed]
70     | [reject: You are not eligible for unemployment benefits]}
71 }
72 ]
73 [set: employmentStatus=NotUnemployed]
74 [ask:
75   {text: Are you over 20 and below pension age?}
76   {terms:
77     {pension age: 65 for women and 67 for men}
78   }
79 ]
```

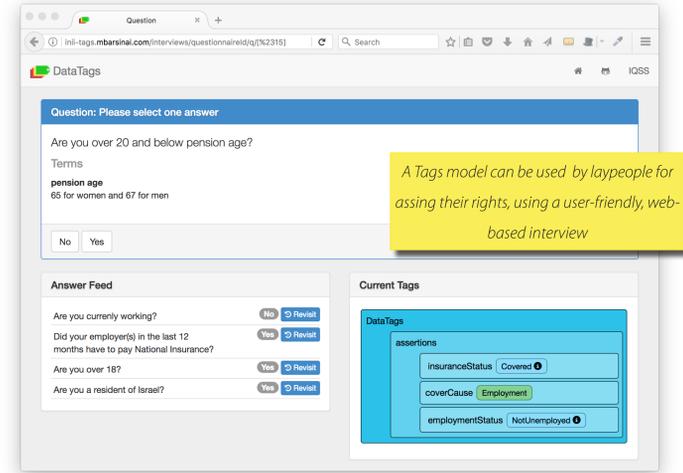
The product of the decision graph are the social benefits provided by the National Insurance Institute for unemployment. Using the Tags tool set, we visualized the decision graph and the policy space. Additional byproduct is an interactive web-based user-friendly interface of the questionnaire. This interview is useful for laypeople and welfare practitioners alike. Tags models are human-readable and machine-actionable. Policy spaces can be standardized and re-used by multiple decision graphs. The framework allows operations over policies (e.g. comparison, composition), and resolution of predicates such as "Case C can be handled by program P", making it easier to assign people to benefit programs. Tags' tool set is open source, and provides tools for developing, inspecting, and querying policy models, a web application for conducting web-based interviews, and a language support package for the Atom text editor.

Contribution

We apply Tags, a framework for modeling data handling policies, to a welfare policy. The generated model is useful for assessing entitlements of specific cases, and for gaining insights into the modeled policy as a whole.

Discussion

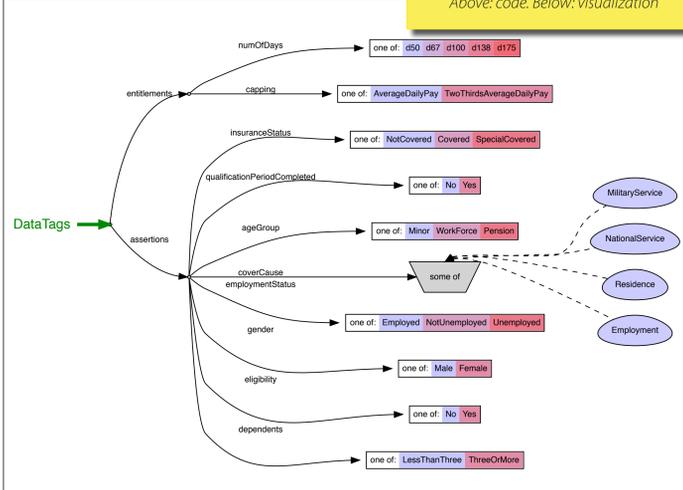
We created the policy space of our model as consisting of two categories: assertions and entitlements. Each claimant has a set of assertions that apply to her. For instance, assertions for the unemployment benefits are set based on one's insurance status, age group, having more or less than 3 dependents, etc. The policy space does not specify the sum to be provided. Rather, the entitlements are based on predefined possible answers that define the number of days for unemployment benefits and the percentage of entitled benefits. A claimant can be entitled to full benefits during the first time-period, and later the percentage drops during the second time-period (currently more than 125 days of unemployment benefits for the first time-period). The decision which assertions and entitlements apply to a specific case occurs in the decision graph. The decision graph can be viewed as a questionnaire: executed as an interactive computation program, where the computer asks the user questions and traverses the graph according to her answers. The decision graph can also be viewed to inspect all possible outcomes of a policy, as it describes the behavior of the modeled policy for every possible combination of answers.



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```
1 DataTags: consists of assertions, entitlements.
2
3 assertions : consists of insuranceStatus, coverCause, eligibility,
4 qualificationPeriodCompleted, gender, ageGroup,
5 employmentStatus, dependents.
6
7 insuranceStatus: one of NotCovered [Not insured under Israeli law],
8 Covered [Insured],
9 SpecialCovered [TBD].
10
11 gender: one of Male, Female.
12 ageGroup: one of Minor, WorkForce, Pension.
13
14 coverCause (Why is the applicant eligible): some of
15
16
```

Policy space for the unemployment section of the Israeli National Insurance law. Above: code. Below: visualization

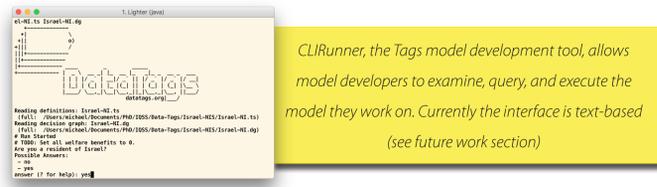


Implications and Future Work

In order to allow larger, more accurate policy models, some improvements are needed. To list a few: One the conceptual level, policy spaces need to allow numeric dimensions (interestingly, these were not needed for data handling policies); sub-spaces of interest need to be described and automatically detected; general policy rules, such as "whenever X holds, Y cannot hold", need to be incorporated into the model; decision graph is currently painfully procedural, which needs to be alleviated. On the technical level, tools for authoring, localizing, and collaborating over models need to be developed. Most of all, this concept needs to be used by multiple people for various policies so it can evolve. We hope providing policy makers and analysts with better policy modeling tools will facilitate better policy-related discussions, while at the same time provide claimants with transparency-enhancing mechanism to better interact with the naming-blaming-claiming process. Both, in hope, will ultimately improve public policies and the processes behind them.

References

[1] Levi-Faur, D. (2014). The welfare state: a regulatory perspective, Public Administration, 92, 3: 599–614.
[2] Sweeney L, Crosas M, Bar-Sinai M. (2015). Sharing Sensitive Data with Confidence: The Datatags System. Technology Science. 2015101601. <http://techscience.org/a/2015101601>
[3] Bar-Sina M, Sweeney L, and Crosas M. (2016). "DataTags, Data Handling Policy Spaces and the Tags Language," IEEE Security and Privacy Workshops (SPW), San Jose, CA, 2016, pp. 1-8. doi: 10.1109/SPW.2016.11



CLIRunner, the Tags model development tool, allows model developers to examine, query, and execute the model they work on. Currently the interface is text-based (see future work section)



The DataTags project is part of Privacy Tools for Sharing Research Data Project, a broad effort to advance a multidisciplinary understanding of data privacy issues and build computational, statistical, legal, and policy tools to help address these issues in a variety of contexts. It is a collaborative effort between Harvard's Center for Research on Computation and Society, Institute for Quantitative Social Science, Berkman Klein Center for Internet & Society, Data Privacy Lab, and MIT Libraries' Program on Information Science. The project is funded by the NSF Secure and Trustworthy Cyberspace project (grant CNS-1237235) with additional funding from Sloan foundation and Google, inc.

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