

Explicit interpretation of the Dutch Aliens Act

Specifications for Decision Support Systems and Administrative Practice

Robert van Doesburg
Leibniz Institute
University of Amsterdam / TNO
Amsterdam, the Netherlands
robertvandoesburg@uva.nl

Tom van Engers
Leibniz Institute
University of Amsterdam / TNO
Amsterdam, the Netherlands
vanengers@uva.nl

ABSTRACT

This is a report of the explicit interpretation of the Dutch Aliens Act using the Calculemus method and the FLINT language. The method has been used before to make normative interpretations of regulations that form the basis for specific services to be delivered by governmental agencies and of legal cases. In this paper, the authors make an interpretation of an entire act, the Aliens Act. We give an overview of methodical choices that enable the analyses of extensive sources of norms, and report on the results of the analysis.

1 Introduction

The Dutch Immigration Service (IND) was amongst the early adaptors of Artificial Intelligence. Using rule-based systems as of the early 1990s, they found that their, once advanced solution for deciding on alien cases, technically outdated in the early 2000s. The processes supported were grown too complicated and consequently too elaborative to maintain. This led to the awareness that the basis for the IND's processes and AI-supported decision-making and case-handling processed needed to be based on entirely new principles, i.e. Rule Governance. According to the Rule Governance principles systems, like the one supporting the IND in its complex tasks, should be based on an aspect-oriented architecture (AOA) with a clear separation between the legal rules and the business requirements for supporting case-handling. In 2012 IND finished the implementation of the new rule-based information system INDiGO. The challenges the IND faced when it was designing and building INDiGO were:

1. Reduce the complexity of processes and systems.
2. Build a system that is flexible and agile in response to changes in sources of norms.
3. Build a system that is supporting professional employees and is not perceived as a straitjacket.

The development of INDiGO was a case study for the NWO-sponsored AGILE project. AGILE is an acronym for Advanced Governance of Information services through Legal Engineering.

In: Proceedings of the Workshop on Artificial Intelligence and the Administrative State (AIAS 2019), June 17, 2019, Montreal, QC, Canada.
Copyright © 2019 for this paper by its authors. Use permitted under Creative Commons License Attribution 4.0 International (CC BY 4.0). Published at <http://ceur-ws.org>

This resulted in several publications [7][13]. More recently INDiGO was used as a study case for a legal thesis on agile law making [14] (in Dutch).

Though INDiGO is doing fine as the information system for the IND, the ambition to build a system that is flexible and agile in response to changes in sources of norms is not fully achieved. At the same time, the need for flexibility and agility in relation to changes in sources of norms, traceability of the origins of norms in the system, and accountability on the compliancy of the system have become more important. The Dutch national government aims to have all public services to be available digitally. Furthermore, there is a debate going on requiring comprehensible explanation for all (automatic) decisions taken by administrative authorities. In co-operation with the Dutch Tax and Custom Administration (DCTA) the Leibniz Institute and the PNA group, the IND has searched for adequate solutions [5][14].

This paper is about the legal engineering aspects of INDiGO. We show an example of the explicit interpretation of the Dutch Aliens Act that aims to:

1. Make explicit interpretations of sources of norms that can be used in multidisciplinary teams consisting of lawyers, policy advisors, administrative workers and knowledge engineers.
2. Make comprehensive, high-level interpretations of sizable amounts of sources of norms.
3. Enable a modular approach that allows adding detailed interpretation at a later time or adding links to interpretation of other sources of norms.
4. Enable structured debate on disagreements on interpretations of sources of norms and the application thereof in specific cases.

In this paper, we will discuss the first three aims. For more on structured debate on disagreements, see [3].

In Section 2, we will give a short overview of the results of early work in our quest for explicit interpretations of sources of norms and its theoretical basis. In Section 3, we will give a short introduction of the Calculemus method and the FLINT language for the explicit interpretation of sources of norms. In Section 4, we will present the results of the analysis of the generative norms in the Dutch Aliens Act. In Section 5, we will discuss results and future work.

2 Early work and Theoretical Framework

In the development of INDiGO the acquiring and modelling of legal knowledge was a bottleneck. Legal experts and knowledge engineers had to work together to make sound models. However, while the legal experts could not see how a piece of text was not sufficient to be machine interpreted, the semantic engineers could not understand the interpretations of the legal experts. Knowledge engineers proposed a method that interprets norms as descriptions of behavior that is either allowed or forbidden [13]. This is essentially a deontic perspective on norms.

The approach succeeded in so far, that using this conceptualization the rule-base of INDiGO was created, that functions reasonably well. The goal of creating a single-source-of-knowledge on norms and rules, however, was not achieved. In our opinion this has two main causes:

1. The pursuit of completeness of the legal framework.
2. The choice for a deontic approach.

By striving to analyze 500+ laws and regulations in order to create a complete normative knowledge base, an impossible task was created. A modular approach that starts with a high-level interpretation of the core of the sources that regulate the work of the IND, would have been better [14]. In this paper we present such an approach.

The choice for a deontic approach neglects the importance of the regulation of the power to act. Power is a under specified concept in AI and Law [16].

In 1931 Kocourek [12] stated that there are different opinions on the number of fundamental normative relations, but that there was nobody that believed that there are more than four. People who follow the deontic approach believe that the fundamental legal relation is the *claim-duty* relation. This means, that in their opinion all normative positions and relations can be expressed using deontic concepts, e.g. Herrestad [10]. Kocourek himself believed that there are two fundamental normative relations: the *claim-duty* relation and the *power-liability* relation. According to Kocourek, Hohfeld is the most important proponent of four fundamental normative relations: *claim-duty* relation, *power-liability* relation, *liberty-no claim* relation, and *immunity-disability* relations [11]. In practice, there is little difference between the position that there are two or four fundamental normative relations. There is not much difference to claiming a *liberty-noclaim* relation is fundamental, or that it is the same as an absent *claim-duty* relation. Therefore, we work with a model that is based on two fundamental normative relations.

In Section 3 we will present an approach that interprets sources of norms from an action perspective. We will do so by introducing the Calculemus method for building explicit representations of normative relations, and the FLINT language to express these representations.

For more on the theoretical base of FLINT, see [4].

3 The Calculemus method

In the last years we have been developing a method that aims to make interpretations of sources of norms that can be used:

1. to make specifications for decisions being taken by machines and people in administrative organizations,
2. to support the grounding of decisions made in courts, and
3. to support the implementation and evaluation of policies in large organizations.

This work has resulted in a method to address questions related to norms between people and in organizations [1][2][3][4]. The goal of this method is to create a method for the interpretation of written or spoken sources of norms in natural language, resulting in specifications for normative multiagent systems that can be used by humans and machines.

For the explicit interpretation of sources of norms, we are developing the Formal Language for the INTerpretation of sources of norms (FLINT). This is a now semi-formal language that is evolved from working on real-life cases. The language consists of three frames: *act frames*, *duty frames* and *fact frames*.

The **Act Frame** is used to describe normative actions performed by an actor that results in normative changes addressed to an agent that is either receiving the results or is an interested party. This frame is called an *act frame*, because it describes all the aspects of the function that changes a state due to a normative action performed by an agent. We make a distinction between the action of the agent and all that is necessary to achieve an effect, i.e. a transition to another normative position. The *act frame* is presented in Table 1.

<i>Act frame</i>	<<name of the <i>act frame</i> >>
<i>Action</i>	Action that causes the transition of an object
<i>Actor</i>	Agent role that is allowed to perform action
<i>Object</i>	The object acted upon
<i>Recipient / Interested Party</i>	Agent role having a normative relation with the actor concerning his action
<i>Precondition</i>	Set of conditions that must be met to allow the action of the actor
<i>Creating postcondition</i>	Facts or normative relations created by action of the actor
<i>Terminating postcondition</i>	Facts or normative relations terminated by action of the actor
<i>References to sources</i>	Reference to the source of the act type, including information on version

Table 1: The Act Type Frame and its Constituents

The *act* consists of the *action* of *actor* upon an *object* that is which is submitted to a transition because of that *action*. The *act* is *valid* if it is performed in a state that meets a *precondition*. If the *action* is performed and the *precondition* is met, the action will result in *normative facts*, and/or *normative relations* being either *created* or *terminated*. The *act type frame* describes a *power-liability* relation in which the *actor* holds a *power* to perform a certain *action* with a functional effect that comes to existence if the *action* is *valid*, i.e. if the *precondition* is met. The *interested party* holds a *liability* related to the action of the actor.

The *act frame* is a concept that exist only in institutional reality. The *act frame* and all its components are constituted by giving additional meaning to events in social reality by qualifying components of these events as components of the act frame, because the component in reality corresponds with the representations of these components in institutional reality. If the act frame is complete a representation is made that can be used to recognize acts in. As a result, *institutional reality* does not have a procedural perspective. The act in reality has a procedural perspective, for the *act frame* time is only relevant to determine the time interval in which sources of norms and/or the interpretation thereof and the time that events in reality are qualified as corresponding to components of the *act frame*.

The result of an *acts frames* can be either the creation or termination of a *fact* (or multiple *facts*) that are *created* because of the transition of the *object*¹ (1), or a deontic relation, a *duty frame* (2).

The **Duty Frame**, see Table 2, represents deontic normative relations and consists of a *duty*, or obligation, that is in effect the state in which an institutional act that ought to be performed in the future, or ought to have been performed in the past in case of a violation of the duty.

<i>Duty frame</i>	<expression of the <i>duty</i> (future act)>
<i>Duty holder</i>	Agent role holding the <i>duty</i>
<i>Claimant</i>	Agent role holding the <i>claim</i>
<i>Creating institutional act</i>	The <i>normative act(s)</i> that creates the <i>claim-duty</i> relation
<i>Enforcing institutional act</i>	The <i>normative act(s)</i> that the <i>claimant</i> can use to enforce the satisfaction of the <i>duty</i> in case the <i>duty holder</i> renounces a <i>duty</i>
<i>Terminating institutional act</i>	The <i>normative act(s)</i> that satisfies the <i>claim-duty</i> relation (effectively terminating it)
<i>References to sources</i>	References to fragments of sources of norms for all frame elements, including information on version

Table 2: The Duty Frame and its Constituents

A *duty frame* consists of an expression of the *duty* involved. It has a *duty holder* and a *claimant*. The *duty frame* also has:

1. One or more *creating act frame(s)* that can create the *duty*,
2. *enforcing act frame(s)* that can be used to enforce the satisfaction of the *duty* in case the *duty holder* renounces his *duty*, and
3. *terminating* (or *satisfying*) *act frame(s)* that effectively terminates the *claim-duty* relation the *duty frame* is an expression of.

In case a *duty holder* is of the opinion that he does not have a *duty*, he can *claim* a privilege or *liberty* towards the *claimant*, using an appropriate *act frame*. The *claimant* and the *duty holder* now have a conflict on the question whether a *claim-duty* relation

¹ The *object* itself can be seen as a *fact* in the role of the *object* of *action*. For example: if an application for a permit is positively decided upon, it results in the *creation* of a

exists, or not. The argument usually will be about the question whether the *normative act* that *created* the *duty* was *valid*, or whether or not the *normative act* that was supposed to *terminate* the *duty* was *valid*. Since this question is about the presence or absence of a *claim-duty* relation there is no need for a separate frame for *liberty-no claim* relations.

<i>Fact frame</i>	[expression of fact]
<i>Function</i>	Boolean function expressing the condition that makes a fact true, or an arithmetic function, e.g. for calculating amounts of money
<i>References to sources</i>	Reference to the source of the fact type, including information on version

Table 3: The Fact Frame and its Constituents

The third frame of the FLINT language concerns the **Fact Frame**. The *fact frame* can be used to make detailed statements on the *precondition* of an *act*. The precondition consists of a function of institutional facts connected by Boolean or arithmetic operators. Every *fact* in the function of a *fact frame*, can be the subject of a new *fact frame*. The level of detail that is pursued depends on the purpose of the analysis. The *fact frame* is presented in Table 3.

4 Analysis of the Aliens Act

In 2018 a FLINT analysis was made concerning the relevant regulations for students and highly skilled workers that want to reside in the Netherlands, using the Calculemus method. Relevant sources of norms were collected, and explicit interpretations were made using the FLINT language. The experiment showed that it was possible to make a modular analysis of specific tasks of the IND using a middle-out approach, thus solving the gridlock caused by striving to completeness that was one of the causes for the unsuccessful attempt to create a single point of truth on normative knowledge for the IND during the development of INDiGO.

The results of this experiment also showed that the core concepts in the INDiGO information system, e.g. qualifications, criteria and evidence, did not, or no longer, reflect the specifications of sources of norms. Since the start of the INDiGO program, the original model, based on qualifications (rights that people want to qualify for), criteria (that should be met in order to be fit to qualify for a qualification), and evidence (with which one can sufficiently proof that a criterium is met) were contaminated because practical solutions were chosen to solve urgent requests of users of the systems. The architectural principles of the original system, as described in [7] were not properly guarded.

The analysis of the sources of norms for specific products, lead to the conclusion that there was a need for administrative specifications that combine a normative perspective with the practical perspective of administrators of the Alien Act. The

permit, and the *termination* of the application, because it is not desirable to take a new decision on the application before withdrawing the first one.

question at hand, was whether it is possible to use the Calculemus method and the FLINT language to analyze larger amounts of sources of norms, without getting trapped by the quest of completeness. In legal analysis there is always the risk to get lost in exotic details, or possible exceptions: very interesting from a legal perspective, but irrelevant from an administrative perspective. We tried to bypass this trap by limiting the analysis to acts, i.e. *act frames*, that are grounded in the Aliens Act. The ratio of this choice is that by looking for *act frames*, we would be able to address all causes for the generation of new *facts* and new normative relations. The generation of normative facts or relation always requires an act.

The Dutch Aliens Act is one of the two main acts that is administrated by the IND.² The Aliens Act regulates more than 80% of the work done by the IND. The question we want to answer using the Calculemus method is: “What Act Frames Can Be Retrieved from the Aliens Act?”

In order to answer that question, we have taken 5 steps:

1. Choose a way to split up the Aliens Act into separate containers of knowledge.
2. Classify constituents of the Aliens Act that contain *act frames*.
3. Make classes of *act frames* that are found in the Aliens Act.
4. Assign *act frames* to the IND.
5. Make guidelines for elaborating pre- and postconditions.

4.1 How to Split Up the Aliens Act in Separate Containers of Knowledge?

In April 2001 the first version of the Aliens Act came into effect. Since than numerous changes have been made to the original text. Every change was separately published by the Dutch government. The versions of the Aliens Act on the web [8] (in Dutch) is an aggregation of the original text and the official publication of all changes to the Aliens Act. For this paper the version that was valid starting July 28, 2018 was used. The full text of the law was divided into clauses, subordinate clauses, and components of enumerations. The English translation of the Dutch legislation in this paper are unofficial translations by the authors. The English designations used are based on the guidelines of the European Union [6]. The reason for decomposing the text of the law, is to make a set of components that are minimal meaningful units.

In Table 4 we show an example is for the decomposition of Article 14 (1) Aliens Act. The decomposition of the Aliens Act into clauses is laid down in a spreadsheet that contains more detailed information of every component of the source, including separate versions of the same component valid at different periods of time. This decomposition will be used as a specification for future tooling for the decomposition of sources or norms. Emile de Maat [15] built a prototype for automatically decomposing Dutch legislation and improving the possibilities for making identifiers for words, or groups of words, in sources of norms.

Unfortunately, this prototype was never taken in production. For the purpose of this paper the decomposition of the Aliens Act was done by hand. De Maat’s did experiment with several methods for the interpretation of norms, but did not come to a satisfying method for the interpretation of sources of norms in natural language.

Reference	Text	Valid since (yyyymmdd)
Art. 14 (1)	1. Our Minister is authorized:	20010401
Art. 14 (1)(a)	a. to grant, reject, or disregard the application to provide a temporary regular residence permit;	20010401
Art. 14 (1)(b)	b. to grant, reject, or disregard the application of the extension of the period of validity;	20010401
Art. 14 (1)(c)	c. to change a temporary regular residence permit, on application or ex officio, due to changed circumstances;	20130601
Art. 14 (1)(d)	d. to revoke a temporary regular residence permit;	20010401
Art. 14 (1)(e)	e. to grant, or to extend the period of validity of a temporary regular residence permit ex officio.	20130601

Table 4: Decomposition of Article 14 (1) Aliens Act

The Aliens Act consists of 1.387 components, of which 1.370 constitute the body of the law. The body of the law consists of 274 structural components, i.e. titles of chapters, divisions, sections, and titles of articles, leaving 1.096 components that contain sources of norms related to immigration policies.

4.2 Which clauses of the Aliens Act can be interpreted as act frames?

An act frame is a classification for a clause, or a combination of clauses, describing a normative act: an action, performed by an actor, on an object, while a precondition is met, with a result and an interested party. So, the question is, which clauses of the Alien Act can be interpreted as being part of an act frame?

Usually a sentence in a source of norm, e.g. the Aliens Act, that can be interpreted as an act frame, contains an action, an actor and the object that is acted upon. Though, not always in the same clause. In Table 4 you can see that the main clause of Article 14 (1) contains an actor (Our Minister³), while the action, and object acted upon can be found in Article 14 (1)(a). That the interested party of this act frame is the alien that submitted the application, can be derived from Article 8 Aliens Act, in which it is stated that an alien has lawful residence in the Netherlands if he has a residence permit as mentioned in Article 14 Aliens Act.

² The IND is responsible for immigration (regulated by the Aliens Act), and naturalization (regulated by the Dutch Nationality Act).

³ The fact that ‘Our Minister’ is the ‘Minister of Justice and Security’ is laid down in Article 1 Aliens Act.

The interpretation of the Aliens Act using *act frames* is done by selecting clauses that contain an action. A preliminary name for the act frame is given to the clause. Then, the source text is examined in order to find the actor, the object and the interested party of the act frame at hand. The exact words from sources of norms are used to express components of the *act frame* and to adjust the name of the *act frame*, if necessary. The precondition and postcondition (results) of the *act frame* are left open for further interpretation at a later time. These parts of the act frame are more complex because precondition and postcondition may be a composition of multiple components from multiple sources.

There are three main groups of *act frames* we found in the Aliens Act. The first group concerns *act frames* that create additional rules, e.g. the creation of rules by order in council, e.g. in Article 2a (2) main clause and under (a) Aliens Act:

By or pursuant to an order in council:

- a. further rules are laid down regarding natural persons and organizations that can act as sponsors;

The second group concerns *acts* that are providing authorities to the Minister of Justice and Security, or to officials that act in his name, e.g. Article 2c (2) main clause and under (a) Aliens Act:

Our Minister is authorized:

- a. to grant, reject or disregard the application for recognition as sponsor,

The third group concerns *act frames* that give authorities to individuals that are an interested party in relation to the Aliens Act, e.g. Article 3 (4) Aliens Act, second sentence:

A decision to refuse entry to the Netherlands, that has already been taken, will lapse as from the time at which the alien indicates that he wishes to submit an application as referred to in the third Paragraph.

Here an alien is given the power to lapse a decision to refuse the entry to the Netherlands by applying for temporary asylum residence permit, i.e. the application mentioned in Art. 3 (3) Aliens Act.

Of the 1.096 clauses of the body of the Aliens Act 250 contained one or more *act frames*. A clause can be the source of multiple *act frames* when a clause contains multiple actions, e.g. the clauses in Article 14 (1) Aliens Act, see Table 4, that represent *act frames* to grant, reject, or disregard the application to provide a temporary regular residence permit.

In the Aliens Act we found a maximum of four *act frames* in one clause. In total, we found a total 428 *act frames* in the Aliens Act.

4.3 Categories of Act Frames in the Aliens Act

The *act frames* in the Aliens Act can be divided in multiple categories. Table 5 gives an overview of the number of items for every constituting element.

Concepts	Number of Items
Actor	12

Action	96
Object	177
Interested Party	29

Table 5: Number of Items per Constituting Element of the Act Frames in the Aliens Act

In order to focus on the *act frames* for which the IND is responsible, we zoom in on the actors for whom a role is laid down in the Aliens Act, see Table 6. The actor charged with most of the acts described in the Alien Act, is the Minister of Justice and Security. These acts include the acts performed by the IND in name of the Minister of Justice and Security. The Dutch Government is involved in slightly less different acts. It concerns the authority to make additional rules by or pursuant to order in council on a large array of specific issues.

Actors	Number of Acts
Minister of Justice and Security	178
Government	161
Official Charged with Border Control	30
Official Charged with the Supervision of Aliens	25
District Court	13
Alien	10
Carrier	4
Administrative Authorities	2
Administrative Law Division of the Council of State	2
Chief of Police	1
Officer in Command of the Royal Netherlands Marechaussee	1
Sponsor (of the Alien)	1

Table 6: Actors in the Aliens Act and the Number of Acts Assigned to them

Officials charged with border control and supervision are mentioned separately because they not only take decisions in writing in name of the Minister of Justice and Security but are also authorized to use physical force for all kinds of acts, including imprisonment. The Commander of the Marechaussee is in charge of border control, the Chief of Police in charge of the supervision of aliens. The District Court is responsible for deciding on legal conflicts related to the Aliens Act. The administrative law division of the Council of State is responsible for the administration of appeals. Carriers responsible for illegally transporting people into the country can be forced to transport people to a place outside the Netherlands free of charge. Aliens and sponsors can perform acts related to their procedures to gain rights regulated by the Aliens Act.

4.4 Which Act Frames are Assigned to the IND?

The Minister of Justice and Security is responsible for tasks he performs personally, but also for a wide array of tasks carried out in his name by officials. The tasks of the IND are amongst these.

Of the 178 tasks assigned to the Minister, 106 are assigned to the IND. These tasks can be divided into 5 main categories:

1. Residence permits and recognized sponsorship
2. Proof of lawful residence
3. Deadlines for taking decisions
4. Collecting and using biometrical data
5. Data and Knowledge Management

The result of this exercise is a complete set of actions the IND can perform based on the Aliens Act, divided in groups related to specific tasks and products. In Section 4.5 we show how the pre- and postconditions of *act frames* are constructed.

4.4.1 Residence permits and recognized sponsorship. The category residence permits and recognized sponsorship contains the core task of the IND. It contains 83 *act frames* concerning 45 objects. The IND administers the providing of four types of residence permits⁴:

1. Provisional residence permit (7 objects, 15 *act frames*)
2. Regular residence permits (12 objects, 25 *act frames*)
3. Residence permits based on European legislation (3 objects, 5 *act frames*)
4. Asylum residence permits (11 objects, 21 *act frames*)
5. Return visa (6 objects, 10 *act frames*).

The provisional residence permit is more like a visa than a residence permit. It is a visa to enter the Netherlands for people that apply for a regular residence permit. The regular residence permit is a residence permit that assigned for other reasons than for the purpose to give asylum. Regular residence permits are granted for specific purposes, e.g. family life, work or study.

In this paper, we will discuss the acts related to the granting, rejecting and disregarding of regular residence permits. The other categories are administered using technically comparable *act frame*, although there are considerable differences from a legal perspective. We will address these differences at another paper.

4.4.2 Proof of lawful residence. The IND is obliged to provide lawful residing aliens with a document or a written statement that proves lawful residence. For this task there are 5 objects and 5 *act frames* because for this category the only action is: to provide.

4.4.3 Deadlines for taking decisions. The Aliens Act requires the IND to decide on application within a limited period of time. There are separate time limits for every category of applications. Also, for all categories there are rules that regulate the possibility to extend the deadline for a decision. After the related *act frames* where extracted from the Aliens Act, we noticed the IND information architecture did not include decisions to extend the term available for deciding on application. Where the IND intends to use rule-based decisions for all tasks its primary process, decisions for extending deadlines were, until now, never seen as separate decisions. There are 10 different objects, 9 of which are

related to extending deadlines for taking decisions, and the other one related to making the decision known to interested parties.

4.4.4 Collecting and using biometrical data. The IND collects fingerprints and facial images of aliens for identification purposes. There are separate *act frames* for requesting biometrical data, collecting it, providing it to other agencies, receiving it from other agencies, and for comparing the fingerprints of aliens with fingerprints stored in a document of an administration. There are 6 objects and 6 *act frames* in this category.

4.4.5 Data and knowledge management. The Aliens Act describes how the IND ought to process personal data. The IND can designate administrations acquiring data concerning aliens and their legal procedures. There are *act frames* for requesting and acquiring data. There is an *act frame* for maintaining an aliens administration. And there are *act frames* for attaching written documents to applications. There are 6 objects and 6 *act frames* in this category.

4.5 Elaborating Pre- and Postconditions of Applications for Regular Residence Permits

Determining the pre- and postconditions of an *act frame* is not a straight-forward procedure. While the other elements of the *act frame* are singular concepts. The *act frame* can only concern one action and has one actor. However, the pre- and postcondition of an *act frame* may consist of complex statements. We will show some examples of complex preconditions and the use of *fact frames* for expressing the details of a complex precondition. The postcondition consists of one or more elements that are created or terminated if an act is valid.

We start with the representation of the *act frame* representing the rejection of an application to grant a temporary regular residence permit, see Table 7. We do so, because the Aliens Act contains specific grounds for rejecting an application to grant a temporary regular residence permit, or to disregard it, but not for granting it. The rules for granting an application must be derived from the inability to reject or disregard it.

Art. 66a (6) Aliens Act states that an alien that has a travel ban or has been signaled for the purpose of refusing entry, cannot have a valid residence permit, asylum nor regular. The same goes for aliens that have been pronounced undesirable based on art. 67 (3) Aliens Act.

<i>Act frame</i>	<<rejecting a temporary regular residence permit>>
<i>Action</i>	[reject]
<i>Actor</i>	[Minister of Justice and Security]
<i>Object</i>	[application to provide a temporary regular residence permit]
<i>Recipient / Interested Party</i>	[alien]
<i>Precondition</i>	([alien has a travel ban or has been signaled for the purpose of refusing entry])

⁴ Permits for long-term residents of the European Union are, strictly speaking, a separate category, because they are based on European regulations. But for the purpose of this paper, they are included in the category regular residents permits.

	OR [alien has pronouncement of undesirability] OR NOT [application contains purpose of residence] OR NOT [alien has a provisional temporary residence permit] OR NOT [alien has a valid border-crossing document] OR NOT [interested party has sufficient, independent, long-term means of support] OR [alien constitutes a threat to public order or national security] OR NOT [alien is willing to cooperate in a medical examination of a disease designated by the Public Health Act or to undergo medical treatment for such a disease] OR [alien has performed any work in violation of the Aliens Labor Act] OR NOT [alien meets the restriction related to the purpose of residence] OR NOT [alien has sufficient knowledge of the Dutch language and Dutch society] OR [alien has provided incorrect data or has withheld data] OR NOT [alien has only resided in the Netherlands on the basis of Article 8 Aliens Act] OR NOT [sponsor has submitted a statement for the purpose of the intended residence of the alien]) AND NOT [adverse consequences of a decision may not be disproportionate to the purposes to be served by the decision]
<i>Creating postcondition</i>	[decision to reject application to provide a temporary regular residence permit]
<i>Terminating postcondition</i>	[application to provide a temporary regular residence permit]
<i>References to sources</i>	Art. 14 (1) Aliens Act, main clause and under (a)

Table 7: Act frame for rejecting a temporary regular residence permit

The next eleven possible grounds for rejecting a residence permit can be found in art. 16 (1) Aliens Act. This article contains a full set grounds for the rejection of the application of temporary regular residence permits. These grounds are only relevant for temporary regular residence permits, not for permanent permits, or for asylum permits. Every one of these grounds has several exceptions, e.g. art. 17 (1) Aliens Act contains a set of exceptions for the condition that an alien must have a provisional temporary residence permit, these exceptions, e.g. based on nationality, are not discussed in this paper.

The last condition, i.e. that a decision may not have adverse consequences that are disproportionate to the purposes to be served by the decision, is not to found in the Aliens Act, it is a

general condition for decisions to be taken by administrative authorities laid down in the General Administrative Law Act (GALA) [9]. GALA provides a framework for Dutch administrative acts. In this paper, we will not go into the details of this matter. The fact that the result of the granting, rejecting or disregarding of an application for a temporary regular residence permit is a decision, is a result of the definition of the concept ‘application’ as the request by an interested party to take a decision (art. 1:3 (3) GALA). The application itself is terminated by deciding on it. If a decision has been taken on an application, it is not possible to make additional decisions on the same application, this is only possible after revoking the decision, as is regulated in GALA.

Disregarding of the application to provide a temporary regular residence permit, see Table 8, is a rather simple *act frame*, it can only be done on the ground that fees due for the settlement of to grant a temporary regular residence permit have not been paid (art. 24 (2) Aliens Act, third sentence). There is also a possibility to disregard application based on art. 4:5 GALA, because this is an act that is not based on the Aliens Act, it is not discussed in this paper.

<i>Act frame</i>	<<disregarding a temporary regular residence permit>>
<i>Action</i>	[disregard]
<i>Actor</i>	[Minister of Justice and Security]
<i>Object</i>	[application to provide a temporary regular residence permit]
<i>Recipient / Interested Party</i>	[alien]
<i>Precondition</i>	NOT [fees due for the settlement of to grant a temporary regular residence permit have been paid]
<i>Creating postcondition</i>	[decision to disregard application to provide a temporary regular residence permit]
<i>Terminating postcondition</i>	[application to provide a temporary regular residence permit]
<i>References to sources</i>	Art. 14 (1) Aliens Act, main clause and under (a)

Table 8: Act frame for disregarding a temporary regular residence permit

This leaves the granting of a temporary regular residence permit, see Table 9. Art. 26 (1) Aliens Acts states that a regular residence permit is granted from the day on which the alien has demonstrated that he meets all conditions, but not earlier than from the day on which the application was received.

Art. 26 (1) is the only condition mentioned in the Aliens Act for granting a temporary regular residence permit. We will elaborate the *fact frame* [regular residence permit is granted from the day on which the alien has demonstrated that he meets all conditions] shortly, but first we will address the other elements in the precondition, and the postcondition of this *act frame*.

The other elements in the precondition —that an alien that is granted a temporary regular residence permit may not have a travel ban or have been signaled for the purpose of refusing entry,

or have been pronounced undesirable based on art. 67 (3) Aliens Act— follow from the *act frame* on the rejection of the residence permit.

<i>Act frame</i>	<<granting a temporary regular residence permit>>
<i>Action</i>	[grant]
<i>Actor</i>	[Minister of Justice and Security]
<i>Object</i>	[application to provide a temporary regular residence permit]
<i>Recipient / Interested Party</i>	[alien]
<i>Precondition</i>	[regular residence permit is granted from the day on which the alien has demonstrated that he meets all conditions] AND NOT [residence permit granted earlier than from the day on which the application was received] AND NOT [alien has a travel ban or has been signaled for the purpose of refusing entry] AND NOT [alien has pronouncement of undesirability]
<i>Creating postcondition</i>	[decision to grant an application to provide a temporary regular residence permit]; <granting a temporary regular residence permit under restrictions>; <determine the period of validity of the regular residence permit>; <provide the alien with a document proving lawful residence>
<i>Terminating postcondition</i>	[application to provide a temporary regular residence permit]
<i>References to sources</i>	Art. 14 (1) Aliens Act, main clause and under (a)

Table 9: Act frame for granting a temporary regular residence permit

The postcondition of the granting of a permit has more elements than the rejecting or disregarding of it. Apart from the creation of decision to grant an application for the provision of a temporary regular residence permit and the termination of the application to provide one, several duties are created. The duties follow from art. 14 (3) Aliens Act, where it is laid down that a temporary regular residence permit is granted under restrictions related to the purpose of residence. Art. 14 (4) Aliens Act requires the determination of the period of validity of the residence permit, that may not exceed a period of 5 years, and Art. 9 (1) Aliens Act requires that a document proving lawful residence is provide to the alien that is granted a residence permit, i.e. to provide the document that is the residence permit. After elaborating the *fact frame* [regular residence permit is granted from the day on which the alien has demonstrated that he meets all conditions] we will show how these duties can be represented in FLINT.

<i>Fact frame</i>	[regular residence permit is granted from the day on which the alien has demonstrated that he meets all conditions]
<i>Function</i>	[alien has demonstrated that he meets all conditions of the regular residence permit] AND [day on which alien has demonstrated he meets all the conditions for a regular residence permit] AND NOT [day on which alien has demonstrated he meets all the conditions for a regular residence permit lies before the day the application was submitted]
<i>References to sources</i>	Article 26 (1) Aliens Act

Table 10: Fact frame for determining whether a ‘regular residence permit is granted from the day on which the alien has demonstrated that he meets all conditions’

<i>Fact frame</i>	[alien has demonstrated that he meets all conditions of the regular residence permit]
<i>Function</i>	[alien allows himself to be photographed and to have his fingerprints taken] AND ([alien meets the conditions to provide a temporary regular residence permit provision] OR [alien meets the conditions for extending a temporary regular residence permit] OR [alien meets the conditions for changing a temporary regular residence permit] OR [alien meets the conditions to provide a permanent regular residence permit])
<i>References to sources</i>	Article 26 Paragraph 1 Aliens Act

Table 11: Fact frame for determining whether a ‘alien has demonstrated that he meets all conditions of the regular residence permit’

The fact [regular residence permit is granted from the day on which the alien has demonstrated that he meets all conditions], see Table 10, is based on Art. 26 (1) Aliens Act.

<i>Fact frame</i>	[alien meets the conditions to provide a temporary regular residence permit]
<i>Function</i>	[application contains purpose of residence] AND [alien has a provisional temporary residence permit] AND [alien has a valid border-crossing document] AND [interested party has sufficient, independent, long-term means of support]

	AND NOT [alien constitutes a threat to public order or national security] AND [alien is willing to cooperate in a medical examination of a disease designated by the Public Health Act or to undergo medical treatment for such a disease] AND [alien has not performed any work in violation of the Aliens Labor Act] AND [alien meets the restriction related to the purpose of residence] AND [alien has sufficient knowledge of the Dutch language and Dutch society] AND NOT [alien has provided incorrect data or has withheld data] AND [alien has only resided in the Netherlands on the basis of Article 8 Aliens Act] AND [sponsor has submitted a statement for the purpose of the intended residence of the alien] AND [fees due for the settlement of to grant a temporary regular residence permit have been paid]
<i>References to sources</i>	Article 26 Paragraph 1 Aliens Act

Table 12: Fact frame for determining whether a ‘alien meets the conditions for granting a temporary regular residence permit provision’

First we split the fact in three, resulting in the fact [alien has demonstrated that he meets all conditions of the regular residence permit], the fact [day on which alien has demonstrated he meets all the conditions for a regular residence permit], and [day on which alien has demonstrated he meets all the conditions for a regular residence permit lies before the day the application was submitted]. The fact [alien has demonstrated that he meets all conditions of the regular residence permit] is then elaborated in Table 11. The other two facts need an arithmetic function to determine whether they are true or false.

In Art. 106a (1) Aliens Act, first sentence, the condition that the alien assists with providing a photograph and fingerprints to being taken. Additionally, from Art. 14 (1) Aliens Act it follows that there are four act types related to regular residence permits, with separate pre- and postconditions. For determining the conditions for granting a temporary regular residence permit we need to zoom in on fact [alien meets the conditions for granting a temporary regular residence permit], see Table 12.

The Boolean function that makes the fact [alien meets the conditions to provide a temporary regular residence permit] true consists of the combination of the precondition of rejecting the application and disregarding it, see Table 12.

4.6 Satisfying Duties Created by Granting a Regular Residence Permit

The duty to grant a temporary regular residence permit under restrictions is created by granting the permit. Enforcing of the duty is possible by submitting a letter of objection. The duty can be fulfilled or terminated by a whole set of acts that are described in the Aliens Decree, an Order in Council that contains the majority of the rules that can be made based on *act frames* in the Aliens Act. For every restriction there is a separate *act frame*, with a specific precondition and a specific result. There are more than hundred separate restrictions, two of them are shown in Table 13.

<i>Duty frame</i>	<<granting a temporary regular residence permit under restrictions>>
<i>Duty holder</i>	[Minister of Justice and Security]
<i>Claimant</i>	[alien]
<i>Creating institutional act</i>	<<grant an application for a temporary regular residence permit>>
<i>Enforcing institutional act</i>	<<submit a letter of objection>>
<i>Terminating institutional act</i>	<<grant a temporary regular residence permit under restriction: Residence as a family member with (name). Work freely allowed. Work permit not required.>>; ... << grant a temporary regular residence permit under restriction: Residence for non-temporary humanitarian grounds. Work freely allowed. Work permit not required. >>
<i>References to sources</i>	Article 14 (3) Aliens Act, first sentence

Table 13: Duty frame for terminating ‘granting a temporary regular residence permit under restrictions’

The determining of the period of validity of the residence permit is done in a comparable way. The rules for determining the period of validity of a regular residence permit are laid down in the Aliens Regulation, a regulation that contains regulations that are created by the Minister of Justice and Security pursuant to an order in council made on the basis of an act as described in the Aliens Act.

The last remaining duty is the duty provide the alien with a document proving lawful residence. There are five types of documents, document I is the type of document that is given to aliens with a temporary regular residence permit. The permit contains personal data of the alien, the restriction under which the permit is valid, and the period of validity.

5 Results and Conclusion

This paper gives an overview of the application of a method for the interpretation of sources of norms to interpret the Aliens Act, and to make administrative specifications of tasks that are the responsibility of the IND. A first validation of these results has been made by a lawyer and a knowledge engineer working for the

IND. In the next months there will be more extensive validations. The IND is about to decide whether to permanently use the presented method for making normative specifications.

The IND is about to decide what method to use to make traceable specifications for all tasks, products and processes administrated by the IND. Suitable alternative methods that can be used on industrial scale have not been found yet.

Results on the mapping of normative concepts on the information architecture are only preliminary. However, the FLINT representation is well received by experts in all relevant disciplines because:

1. They are perceived not to be merely technical but based on sources of norms.
2. The extensive references to sources provides insight in relations between information concepts, that cannot be (easily) found within the current information system systems, nor their architecture.
3. The modular approach, starting with a high-level interpretation that enables validating comprehensiveness, combined with the possibility to go into any level of detail, where necessary.

Further debate and validation of the results presented in this paper, may result in changes in the interpretation. It is one of the purposes of this method to clarify chosen interpretations and support argumentation about what is the ‘right’ interpretation [2][3]. We will report on the outcome of this process, and on possible modifications of the method resulting from it.

The analysis of the entire Aliens Act was performed by one single person within one month. This shows that a high-level analysis of the sources relevant to a complex governmental agency could be done in a relatively short period of time. Discussions on priorities for the elaboration of the results are taking place. Large-scale application of the method, working with multiple analyzers in multiple organizations demand further development particularly the development of tool support for modelers as well as the generation of IT-components. Both activities have been planned and first results are expected within the current year. In the coming weeks the IND will set priorities for elaborating details in preconditions. Furthermore, comparable interpretations of the Dutch Nationality Act, GALA and the General Data Protection Regulation (GDPR) will be made.

ACKNOWLEDGMENTS

The Dutch Science organization NWO for sponsoring projects like the AGILE project, DL4LD, VWData and others that allow us to work on normative systems, which we believe are pivotal for creating the responsible AI systems of the future.

REFERENCES

- [1] Robert van Doesburg, Tijs van der Storm and Tom M. van Engers. 2016. CALCULEMUS: Towards a Formal Language for the Interpretation of Normative Systems. In: *AI4J Workshop at ECAI 2016*, The Hague, Netherlands.
- [2] Robert van Doesburg and Tom M. van Engers. Using Formal Interpretations of Legal Sources for Comparing the Application of Exclusion Clauses of the UN Refugee Convention. In: *Jusletter IT* (Feb. 2018), 175-184.
- [3] Robert van Doesburg, Tom M. van Engers. 2018. Arguments on the Interpretation of Sources of Law. In: *AI Approaches to the Complexity of Legal Systems*. AICOL 2015, AICOL 2016, AICOL 2016, AICOL 2017, AICOL 2017. Lecture Notes in Computer Science, vol 10791. Springer, Cham, 487-492. DOI: https://doi.org/10.1007/978-3-030-00178-0_33
- [4] Maria Dymitruk, Réka Markovich, Rūta Liepiņa, et al. 2018. Research in Progress: Report on the ICAIL 2017 Doctoral Consortium. *Artif. Intell. Law* 26, 1 (March 2018), 49-97. DOI: <https://doi.org/10.1007/s10506-018-9220-6>
- [5] Tom M. van Engers and Sjur Nijssen. 2014. From legislation towards the provision of services. In: *Electronic Government and the Information Systems Perspective Lecture Notes in Computer Science*, pp. 163-172. DOI:10.1007/978-3-319-10178-1_13.
- [6] European Union. 2015. Joint Practical Guide of the European Parliament, the Council and the Commission for persons involved in the drafting of European Union legislation. DOI: <https://doi.org/10.2880/5575>
- [7] Yiwei Gong. 2012. *Engineering Flexible and Agile Services: A Reference Architecture for Administrative Processes*. Dissertation. Delft University of Technology, Delft, Netherlands.
- [8] Dutch Government. Aliens Act (in Dutch). <https://wetten.overheid.nl/BWBR0011823/>.
- [9] Dutch Government. General Administrative Law Act (in Dutch). <https://wetten.overheid.nl/BWBR0011823/>
- [10] Hennin Herrestad. 1991. Norms and Formalization. In *Proceedings of the 3th International Conference on Artificial Intelligence and Law (ICAIL '93)*. ACM Press, New York, NY, 175-184. DOI: <https://doi.org/10.1145/112646.112667>
- [11] Wesley N. Hohfeld. 1913. Some Fundamental Legal Conceptions as Applied in Judicial Reasoning. *Yale Law Journal* 23(1), 16-59.
- [12] Albert Kocourek. 1930. *An Introduction to the Science of Law*, Little, Brown, and Company, Boston.
- [13] Patrice Kordelaar, Freek van Teesling and Edwin Hoogland. 2010. *Acquiring and Modelling Legal Knowledge Using Patterns: An Application for the Dutch Immigration and Naturalisation Service*. In: *Knowledge Engineering and Management by the Masses (EKAW 2010)*. Lecture Notes in Computer Science, vol 6317. Springer, Berlin, Heidelberg.
- [14] Mariette Lokin. 2018. *Wendbaar Wetgeven (Agile Law Making)*, PhD thesis, Boom Juridisch, The Hague, Netherlands. (in Dutch)
- [15] Emile de Maat. 2012. *Making Sense of Legal Texts*. PhD Dissertation. University of Amsterdam, Amsterdam, Netherlands. SIKS dissertation series no. 12-26
- [16] Giovanni Sileno. 2016. *Aligning Law and Action: a conceptual and computational inquiry*. Ph.D. Dissertation. University of Amsterdam, Amsterdam, Netherlands. SIKS Dissertation Series No. 2016-37.