

Logic Programming in modern e-Government Services

Markus Triska
Austrian Federal Ministry for Digital and Economic Affairs
Department I/5: e-Government for Businesses

June 23rd 2020

Logical Reasoning in the Administration

- ▶ *Because* you run a business of type T , ...
- ▶ *Because* you are replying within the deadline, ...
- ▶ *Because* you are a citizen of Austria, ...
- ▶ *Because* you broke the speed limit L , ...
- ▶ *Because* you are studying, ...
- ▶ *Because* you have applied for a grant, ...
- ▶ etc.

Legalitätsprinzip

- ▶ *All administrative acts must be rooted in laws.*
- ▶ **constitutional principle** in Austria (Art. 18 Abs. 1 B-VG)
- ▶ **Motivation:** Administration must behave *predictably*.
- ▶ ⇒ decisions must be explainable, traceable, justifiable
- ▶ ⇒ *symbolic* AI methods are of particular relevance

The challenge is *not* to guess the laws from data.

The laws are already known!

The challenge is to **automate reasoning about laws**.

Codex as Code

- ▶ in the ideal case, law is *automatically* executable
- ▶ various projects to formulate laws as logic programs
- ▶ Examples:
 - ▶ eligibility for *grants*
 - ▶ proof of identity
 - ▶ delegation of powers
 - ▶ cross-border use cases
 - ▶ answer queries about laws
 - ▶ etc.
- ▶ we need better methods to implement this
- ▶ *logic programming languages are an ideal fit*

Public Sector IT-Services

- ▶ public sector IT-service \simeq *automated* application of law
- ▶ IT-services in our department:
 - ▶ Business Service Portal (<https://www.usp.gv.at>)
 - ▶ e-Delivery
 - ▶ e-Procurement
 - ▶ electronic forms service
 - ▶ Once Only Principle
 - ▶ etc.
- ▶ many other IT-services in the public sector
- ▶ example: *tax administration*

Perspective: IT-service as Platform

Goal: Intelligent **customization** and **extension** of our services.

- ▶ “*If* I am on holiday, *then* I want to be notified differently.”
- ▶ “My attorney shall automatically receive a copy.”
- ▶ services between users, *smart contracts*
- ▶ needs a simple dynamic extension language
- ▶ cooperation on data analysis etc.

European Context

- ▶ European Union (EU) has **27** member states (MS)
- ▶ Legal acts:
 - ▶ **regulations** (self-executing)
 - ▶ **directives** (require national acts)

Examples:

Single Digital Gateway Regulation (SDGR)

General Data Protection Regulation (GDPR)

- ▶ *Coordinated Plan on AI (2018)*
- ▶ *White Paper On AI (2020)*
- ▶ *Ethics Guidelines for Trustworthy AI*
- ▶ national AI strategies (*ongoing*)

Single Digital Gateway (SDG)

- ▶ *Goal*: **cross-border** use cases
- ▶ *Example*: Spanish company creates branch in Austria
- ▶ country-specific *ways* to provide and *prove* evidences
- ▶ query registers, upload documents, ask citizen etc.
- ▶ *executable* descriptions are needed
- ▶ needs formulation of logical *rules*

evidence(place_of_birth(Person, Place)) ← ...

Importance of Standards

Standards are very important in the public sector.

Standards . . .

- ▶ are a prerequisite for teaching
- ▶ ensure compatibility of solutions
- ▶ allow efficient cooperation
- ▶ simplify procurement
- ▶ increase markets for companies
- ▶ help mitigate legal disputes
- ▶ reduce implementation costs
- ▶ etc.

Standardisation

We represent our Ministry in several standardisation groups:

- ▶ ISO/IEC JTC1/**SC42 Artificial Intelligence**
- ▶ ISO/IEC JTC1/SC22/**WG17 Prolog**
- ▶ ASI AG **001.88 Blockchain**

Please contribute!

Many important aspects of Prolog need standardisation.

Other topics are closely related to logical reasoning.

Many opportunities for cooperation.

The search for Prolog

We need Prolog systems to implement new kinds of services.

Desiderata:

- ▶ **conforming** to the standard (*sine qua non*)
- ▶ freely available
- ▶ efficient parsing of large amounts of text
- ▶ modern language constructs (constraints, `if_/3` etc.)
- ▶ monotonicity (`..._si/1` etc.)

Mark Thom's *Scryer Prolog* is a very promising new system:

<https://github.com/mthom/scryer-prolog>

Invitation for Cooperation

I invite you to cooperate with us on these topics!

- ▶ Interesting ideas?
- ▶ Comments?
- ▶ Questions?
- ▶ Experiences?
- ▶ Project proposals?
- ▶ ...

Contact: `markus.triska@oesterreich.gv.at`