

A model of Air Transport Passenger Incidents and Rights

Víctor Rodríguez-Doncel^a, Cristiana Santos^b, and Pompeu Casanovas^{b,d}

^a*Ontology Engineering Group, Universidad Politécnica de Madrid*

^b*Autonomous University of Barcelona-Institute of Law and Technology*

^d*Royal Melbourne Institute of Technology-Centre for Applied Social Sciences*

Abstract. This paper describes a representation of the legal framework in the air transport passenger's rights domain and the foremost incidents that trigger the top of consumer complaints ranking in the EU. It comprises the development of a small network of three ontologies, formalisation of scenarios, specification of properties and identification of relations. The approach is illustrated by means of a case study based in the context of a real life cancelled flight incident. This is part of an intended support-system that aims to provide both consumers and companies with relevant legal information to enhance the decision-making process.

Keywords. ontology, air transport passenger rights, incidents, dispute resolution.

Introduction

Air passenger transport typifies the industry with the highest incidence of disputes, worst reputation and with low resolution rate outside court¹, even after the entry into force of the EU's Air Passenger Rights Regulation 261/2004². This underperforming dispute market status is affirmed in significant sources³. We are cognizant of the main reasons⁴ underlying this failure, which stems from: *i*) existent legal grey areas; *ii*) unawareness of passengers' rights; *iii*) complex complaint handling procedures.

¹ Airlines are not obliged to adhere to alternative dispute resolution schemes, given its voluntary bases that do not provide binding decisions, Article 2 of the Directive 2013/11/EU (hereinafter ADR).

² Hereinafter (EC) Regulation. This Regulation N.º 261/2004 of the European Parliament and of the Council of 11 February 2004 establishes common rules on compensation and assistance to passengers in the event of denied boarding and of cancellation or long delay of flights.

³ According to *i*) the 2011 Report disclosed by the European Parliament; *ii*) the ECC-Net 2011 Air Passenger Rights Report (available in http://ec.europa.eu/consumers/ecc/docs/ecc_net_air_passenger_report_2011.pdf); *iii*) the ECC-Net 2012 ADR in the APR Sector Report, available in http://www.ecc.lt/index.php?id=602#.U80gl_mSywd; *vi*) the ECC-Net 2012 Annual Report. It is worth illustrating a partial extraction of this latter: "(...) air transport was at the origin of more than 20% of all complaints (of which luggage issues represented only a minor proportion compared to other issues linked to the denial of passenger rights or unfair commercial practices (...)", p.12, available online in http://ec.europa.eu/consumers/ecc/docs/report_ecc-net_2012_en.pdf; and finally *v*) the SWD (2014) 156 final, Commission Staff Working Document on Complaint Handling and Enforcement by Member States of the Air Passenger Rights Regulations. The document reflects the period from 2010 to 2012 (by comparing data, where possible, with the previous reporting period (2007-2009)). It thus reflects quantitative complaint handling data.

⁴ Air Passenger Rights Revision - summary European Commission - MEMO/13/203, available online in http://europa.eu/rapid/press-release_MEMO-13-203_en.htm.

This assertion substantiates the research question of this paper: how to represent, in a support-system, the legal relevant information in the Air Passenger's Rights realm (APR), the incidents that cause the main disputes, and the workflow to follow in case of a complaint, permitting both consumers and airlines to understand their legal position and make an informed decision in real-time assets. This approach is enhanced with knowledge representation techniques (legal ontologies) and empirical knowledge acquisition procedures. This is a devising paper to work out CogniCor's⁵ concerns of informing consumers properly about their rights when filing an online complaint. Empowering consumers with reliable legal information is a good strategy to foster trust and to avoid further unintended consequences arising from the new European legislation on ADR —Directive on Alternative Dispute Resolution (2013/11) and the associated Regulation on Online Dispute Resolution (EU Regulation 2013/524)[1].

The paper is structured as follows. After reviewing previous work in the field, we provide a description of the legal framework model, and then we proceed with its expression as a set of networked ontologies.

1. Related work

According to our best knowledge, there is no ontological representation applied to the APR sector that endows to the conflictive parties legal information. Nevertheless, there are other services that cover the terms we deal with. From the point of view of this paper's objective, Flightright's service⁶ is particularly interesting; it calculates the potential compensation that a passenger might be entitled to in case of cancellation, denied boarding or long flight delay. The procedure starts with an estimation from the compensation calculator; then it is manually evaluated the chances of a successful claim collection. If the prospects are promising, thereby they bring the claim forward against the airline, tracking its status; yet this course of action (stage of the process, enforcement of the claim) still depends on each airline's regulation policies and their willingness for settlement.

The following examples by no means exhaust the richness of approaches existing in IT-based support systems, tools and services, which constitute a very lively and dynamic changing field. We portray in a concise manner other illustrative references, such as *i)* Ontomedia and Consumedia Projects [2][3] aimed to provide basic legal resources to citizens involved in consumer mediation processes; *ii)* the Eunomos software [4][5], currently in the basis of a commercial service through the spinoff company Nomotika srl⁷, is being developed as a legal knowledge management service which is intended in the forthcoming future to enable users to view legislation from various sources and find the right definitions and explanations of legal concepts in a

⁵ CogniCor provides online automated complaint resolution services; its state of the art based technologies, automated agreement and adaptive machine learning technologies enhances resolving complaints) [8]; (<http://www.cognicor.com>).

⁶ <http://www.flightright.com/>. Overall, Flightright doesn't manage baggage neither incidents related to the service itself, as we intend to use in the forthcoming future. It should be noted that the contextualized information regarding the procedures to claim and involved institutional entities are out of the spectrum of the provision of this service, information which we assume enhances decision-making. Considering the complexity of the arguments outlined by this powerful industry, the range of extraordinary circumstances, the plethora of the legislative agenda on ATP domain by the policy-makers (binding or non-binding information resources), we may infer that the calculus of an eventual compensation fits only the company's interests.

⁷ <http://www.nomotika.it/>

given context; *iii*) the BEST-project [6] consisted in a prototype to provide laymen information about their legal position in a liability case; *iv*) the application of game theory and case-based analysis (Asset Divider) to family disputes[7] [9].

2. Methodology

In order to represent the APR domain, different procedures were followed combining analytical and experimental work. To this end, we gathered information from the ten's largest airlines. To assemble a comprehensive representation of these companies, we followed a criteria related to the number of passengers carried, revenue, and number of passenger-kilometers flown⁸. We analysed their current general terms and conditions of carriage, procedures, workflow and their required web-forms alike. We considered the legal framework related to APR domain: we pondered the relevant and supporting legislation⁹; consulting¹⁰ and auxiliary¹¹ official documents were accounted for this further analysis, as well as official reports¹². Significant case-law from the ECJ was regarded to frame the legal framework¹³. From the surveyed data we had access to statistics of APR cases, development comparisons concerning previous years, (un)solved cases within ADR schemes, recommendations and conclusions. The manually retrieved information was used to model the scenarios and to populate the ontologies' concepts and their dependency relationships.

The implicit knowledge acquired is three-fold, leading hence to the definition of three-related OWL ontologies: the complaint workflow ontology, the flight incident ontology and the flight incident legal framework ontology, as described in the following section. These models are iteratively evolving, as they are used to express actual incidents, complaints and related rights, of which Section 4 is an example. From this experience, a set of SWRL rules is in the process of being defined, whose use in actual technological applications will complete the picture of ontologies, rules and applications supporting passengers and air carriers alike.

3. Formalization

The knowledge base of Air Transport Passenger Incidents and Rights (ATPIR) was designed in a formal model that describes the incidents and its circumstances, tackles

⁸ American Airlines, Air France, Delta Airlines, Lufthansa, Ryan Air, Air China, amongst others, in http://en.wikipedia.org/wiki/World's_largest_airlines.

⁹ Communication from the Commission from to the European Parliament and the Council on the application of the Regulation, COM(2011) 174 final; Commission staff working paper accompanying document to the Communication; Communication from the Commission to the European Parliament and the Council pursuant to Article 17 on the operation and the results of this Regulation, COM(2007) 168 final; Communication from the Commission from to the European Parliament and the Council: A European vision for Passengers: Communication on Passenger Rights in all transport modes, COM/2011/0898 final.

¹⁰ Complaint handling and enforcement by MS of the APR Regulations [SWD(2014) 156]; Public Consultation for the proposal of revision of the (EC) Regulation (19/12/2011 - 11/03/2012).

¹¹ The passenger rights EU complaint form and the National competent authorities' document.

¹² Special Eurobarometer on APR and the European Consumer Centers Network Reports.

¹³ E.g. one right consolidated in jurisprudence (and not in the (EC) Regulation) states that passengers may be entitled to compensation for flights where delay in arrival in 3 hours or more and when the delay is not due to extraordinary circumstances.

the complaint processing workflow and is acquainted with the applicable regulations. The ontologies reuses or maps to concepts defined in other related vocabularies such as the provenance ontology (PROV-O)¹⁴, the LKIF core ontology [9] or Geonames¹⁵. The permanent, resolvable IRI of these ontologies is shown in Table 1:

Table 1. Ontologies and their IRIs.

Ontology	prefix	IRI
Flight Incident	atpir-fi	http://purl.org/NET/atpir-fi
Complaint Workflow	atpir-cw	http://purl.org/NET/atpir-cw
Flight Incident Legal Framework	atpir-filf	http://purl.org/NET/atpir-filf

i) Complaint Workflow Ontology defines the integrative workflow upon which a passenger might bring a complaint when a dispute arises. It comprises the iterative steps, such as *a)* submitting the complaint, avoiding this way irresponsiveness of the airline; and *b)* adding proof documents (and which) to sustain the redress request; it specifies the standard complaint format and the involved parties in the management of a complaint. In this way we may tackle complex and tailor-made handling procedures, evading from difficulties encountered by passengers in enforcing their rights due to ill-defined, contingent and burdensome complaint-handling processes.

ii) Flight Incident Ontology expresses the flight disruptions that frame the air transport dispute market: *a)* baggage incidents (delayed, damaged, and missing); *b)* flight incidents (delayed, cancelled, denied); and *c)* service incidents (unfair commercial practises, bad quality service and irresponsiveness), which may reveal if the passenger has a case and thus is eligible for redress (discouraging unmeritorious complaints).

iii) Flight Incident Legal Framework Ontology models the rights-based approach. *PassengerRights* group encloses the entitled rights related to cancelled, denied and delayed incidents, as defined both in the EC Regulation and in case-law (*Information, Assistance, Rerouting, Compensation, Reimbursement and Return*) and defines when and how the rights are applied. Subclasses of *Sources* will refer to the companies' policies, combined with the existent legal framework (EU Air Transport Law), which is compounded of the EU Regulation, Communications and the case-law from the ECJ.

4. Case-Study

The narrative of the case refers to the context of a real-life complaint¹⁶:

It consists in a cancelation of a flight regarding the air carrier Anonymair, with the flight number 7473, from Eindhoven, departure time at 10.50h a.m. to Porto, with the estimated arrival time at 12.25h p.m., on the 25th of March of 2012. The passenger received an email on the same day, at 9.45h a.m., from the air carrier, stating that the flight was canceled due to extraordinary circumstances, due to adverse weather conditions. In this email was declared the possibility to rebook free of charge a flight to the same destination, subject to availability. The provided flight occurred in the next day and departed from Maastricht. The consumer argues about the transport costs, accommodation and meals.

According to the construal of the legal framework, and as an early instantiation, we consider that the case falls under the scope of the (EC) Regulation (it is a Community carrier) and that the passenger has grounds for redress regarding¹⁷:

¹⁴ <http://www.w3.org/TR/prov-o/>

¹⁵ <http://www.geonames.org/ontology/>

¹⁶ Provided by a Consumer Association "DECO" (<http://www.deco.proteste.pt/>). These incidents are mostly company confidential and aren't available for broad publications, or they are not officially reported.

i) Assistance, cf. Articles 9(1)(a), 9(2), which consists of meals/refreshments, and telecommunications (two telephone calls, telex or fax messages, or e-mails); in the event of rerouting, which is our case, when the reasonably expected time of departure of the new flight is the following day, it shall be offered accommodation and transport between the airport and the place of accommodation, cf. Article 9(1)(b) and 9(1)(c).

ii) Information as a written notice setting out the rules for compensation and assistance and the possible alternative transport, Article 5, (2) and Article 14(2).

iii) Choice between: (a) Refund within 7 days, Article 7(3) or *(b) Re-routing*, under comparable transport conditions, to their final destination at the earliest opportunity or at a later date at the passenger's convenience, subject to availability of seats.

5. Enabling a technological application

This ontology-driven application would encode the most relevant elements in the incident as instances of the OWL classes in the ontologies referred in Section 3: passenger, air carrier, flights, airport of the incident etc. These instances would be duly attributed with OWL datatype properties (like the flight number or departure time) and related to other resources with object properties (for example connecting the flight with a departure and an arrival airport). These linked resources may be Linked Data published from external sources in a well structured manner, allowing some sort of inferences. For example, some aspects of the case study of Section 4 may be codified with the following RDF statements:

```
:passenger a Passenger .
:flight7473 a Flight ;
  hasFlightCode "FA7473" ;
  hasAirline :fictionAir ;
  atpir-fi:hasDeparture <http://sws.geonames.org/2735943/> ;
  atpir-fi:hasDestination <http://sws.geonames.org/2756253/> .
```

The flight causing the incident is described with the IATA code number, the airline or the departure and destination airports. The airport cities are represented with resources published by Geonames, which also asserts the nation for every city. A simple query can retrieve a relevant fact about the incident: whether it happened in an intra-Community flight, or whether it was a long-haul flight or not. The assignment of rights to the user can be done by means of a SWRL rule:

```
Incident(?i) ^ hasFlight(?i, ?f) ^ IntraCommunityFlight(?f) ^
hasParty(?i, ?p) ^ CancelledFlight(?f) ^ reasonForCancellation(?x,
"Extraordinary circumstances") => rightTo(?p, :assistance) ^ rightTo(?p,
:information) ^ rightTo(?p, :refundOrRerouting)
```

The rule reads: "If the flight is cancelled due to extraordinary circumstances, then the passenger has rights to assistance, information and refund or rerouting". Indeed, this rule depends on the provided information (e.g. it is true that there were extraordinary

¹⁷ It should be stated that the airline was not obliged to provide compensation in case of extraordinary circumstances, which are events that cannot have been avoided or foreseen, even if all reasonable measures had been taken, namely circumstances which are beyond the air carrier's actual control, according to Article 5, Paragraph 3, such as meteorological conditions incompatible with the operation of the flight.

circumstances), but it can help the passengers with some information to consider before lodging a complaint, abandoning the actual claim or adjudicating their case in court.

6. Conclusion

We consider that applying a technology-assisted dispute resolution system may constitute a promising approach to the APR sector. To achieve this purpose, an hand knowledge acquisition process was outlined and an initial modelization was provided towards obtaining the set of requirements for the decision-support tool. A simple rule-based demonstration was described in order to support the comprehension of the proposed system. We presented the preliminary steps towards the intended system which is in its groundwork stage but it is a footstep in the direction of the semantic web applied in the air APR domain.

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