Aviation Community Recommended Information Services Semantic Model Request for Proposals

Contents

1   General Information

In 1991 airport operators around the world created Airports Council International – the first worldwide association to represent their common interests and foster cooperation with partners throughout the air transport industry. Through ACI, the airport community now speaks with a single voice on key issues and concerns and, despite regional diversity, can move forward as a united industry.

ACI pursues airports interests in discussions with international organisations. The most important relationship is with the International Civil Aviation Organization (ICAO), where international standards for air transport are debated and developed. ACI defends airports positions and develops standards and recommended practices in the areas of safety, security and environment initiatives. It also advances and protects airport interests in important policy changes on airport charges and regulation, strengthening the hand of airports in dealing with airlines.

At the same time, ACI provides the platform for pursuing a constructive and cooperative relationship with the airline associations such as IATA, governments and regulators. On critical industry issues – liberalisation, ownership, capacity planning, regulatory restrictions, and environmental action – ACI defends airports views and strengthens their ability to shape the future of our industry, backing up individual airport actions.

1.1   Introduction

1.1.1 Context

An Airport may be regarded as an ecosystem of service providers that collaborate to produce and deliver aeronautical and non-aeronautical services to the travelling public and to each other. These organisations are made up of people and technology

The organization and accessibility of large volumes of data is a cornerstone strategic objective of any modern airport. To this end, ACI and the Airport community has developed a framework that defines a common airport information language, the ACI ACRIS Semantic Model, which supports the categorization and organization of information in an airport environment.

The ACRIS Semantic Model is the aviation community's shared vocabulary, based on a representation of the community's common knowledge.

1.1.2 Purpose of the RFP

To date, the ACRIS Semantic Model has been developed and maintained through voluntary efforts by the staff of a number of ACI-member airports. ACI World now wishes to engage industry vendor expertise to provide full-time support for the development, adoption and maintenance of the ACRIS Semantic Model.

ACI World, located at 800 rue du Square Victoria, Montréal, Québec, Canada, is seeking competent vendors in relation to the ACRIS Semantic Model for the aviation industry, who can to (a) maintain the model,(b) facilitate its further development, (c) design and execute training programmes and (d) provide support for users of the model.

The contract term shall be initially for three (3) years from the contract start date, with the possibility of extension for further 3 years terms.

Proposers shall provide a clear, concise explanation of their capability to satisfy the requirements of this RFP. Each proposal shall be submitted in the requested format and shall provide all pertinent information, including but not limited to information relating to the contractor's capability, experience, financial resources, cost and business model management structure and key personnel, and other information as specified in this RFP.

This RFP may also be found electronically at http://www.aci.aero/About-ACI/Priorities/Airport-IT

1.2 ACI Rights

ACI World's rights include, but are not limited to, the following:

- Issuing addenda to the RFP, including extending or revising the timeline for submittals.
- Withdrawing, reissuing, or modifying the RFP.
- Requesting clarification and/or additional information from any proposer at any point in the procurement process.
- Executing a Contract with a proposer on the basis of the original written proposal (without conducting interviews) and/or any other information submitted by the proposer during the procurement process.
- Rejecting any or all proposals, waiving irregularities in any proposals, accepting or rejecting all or any part of any proposals, waiving any requirements of the RFP, as may be deemed to be in the best interest of ACI World.

1.3 Proposer's Responsibilities

Proposals shall be evaluated on the basis of ability to meet requirements, experience, and proposed financial structure. It is the responsibility of each proposer to:

- Examine this RFP, including all appendices and the attached Contract, thoroughly.
- Provide evidence that they are an ACI World Business Partner

- Consider applicable local laws, regulations and other applicable laws, rules and regulations that may affect costs, permitting, progress, performance, or services.
- Clarify, with ACI World, any conflicts, errors, or discrepancies in this RFP prior to the Proposer Questions/Clarifications submission deadline as provided in the RFP Schedule.
- Agree not to collaborate or discuss with other proposers the content of the proposal or service fees proposed.
- Prior to submitting a proposal, each proposer will, at his/her own expense, make or obtain any additional examinations, investigations, and studies; and obtain any additional information and data that may affect costs, permitting, progress, performance or furnishing of the project that proposer deems necessary to determine its proposal.
- Each proposer shall use email to deliver their proposal at its own risk, and ACI World shall not be obligated to accept or respond to any submission that is delayed due to delivery failures.

1.4 Rights of Proposer

ACI World will not publicly disclose proprietary information obtained as a result of this RFP. To the full extent that it is protected by law and regulations, information identified by a proposer as Proprietary or Confidential will be kept confidential.

The submission of a proposal shall not be deemed an agreement between the proposer and ACI World. The proposal is a contractual offer by the proposer to perform services in accord with the proposal. Specifically, ACI World shall not be obligated to respond to any proposal submitted nor be bound in any manner by the submission of a proposal.

1.5 Cost of Submitting Proposals

The cost of investigating, preparing, and submitting a proposal is the sole responsibility of the proposer and shall not be chargeable in any manner to ACI World. ACI World will not reimburse any proposer for any costs associated with the preparation and submission of a proposal, including but not limited to, expenses incurred in making an oral presentation, participating in an interview, or negotiating a Contract with ACI World.

2 Background

2.1 Context

The purpose of the proposed ACRIS Semantic Model is to promote an open data strategy for the aviation community in general and the airport business in particular. The ACRIS Semantic Model enables the production of standard data structures for input into the ACRIS API development process and the production of apps for the benefit of the travelling customer.

ACI World supports open standards architectures and facilitates the development of open data standards with airports through the Airport Community Recommended Information Services (ACRIS) Board.

The ACRIS Semantic Model has already enabled the completion of several initiatives such as Self-Service Bag Drop, Seamless Travel, A-CDM (Airport Collaborative Decision Making), Airport Maps, Passenger Wait Times, Airport Car Parking, Baggage Performance Management, Airport Security Operations Performance Management, Airport Wildlife Hazard Management, Airport Energy Utilisation Performance Management. Building Controls Automation Performance Management. The ACRIS Semantic Model is also being used to define standards based open interfaces for a common Flight object, single Passenger Identity and a connected Aircraft object.

Airports and other stakeholders use the ACRIS Semantic Model to establish collective data sharing arrangements with each other and with other aviation sector stakeholders, most notably airlines.

To date, the ACRIS Semantic Model has been developed and maintained through ACI and voluntary efforts by the staff of a number of ACI-member airports. ACI now wishes to engage industry vendor expertise to provide full-time support for the development, adoption and maintenance of the ACRIS Semantic Model.

3 Project and Services Description and Scope

ACI World requires a competent vendor to:

1. Provide an easy-to-use and navigable cloud hosting environment for the ACRIS Semantic Model and its related documentation
2. Maintain professional licences for an appropriate Enterprise Architecture tool.
3. Ensure that online and offline copies of the model are made available via a web interface to registered visitors on the site.
4. Co-locate Business Requirements Specification and Implementation Guides with the ACRIS Semantic Model.
5. Provide a Change Management tracking service closely integrated to the ACRIS Semantic Model to enable the lifecycle management of change requests that impact the model and other artefacts based on it at the model object and property levels.
6. Implement required changes to the ACRIS Semantic model that have been specified and agreed by the ACRIS working group.
7. Support ACI members and the wider aviation community in understanding and using the ACRIS Semantic Model
8. Ensure that the ACRIS Semantic Model Service is extensible and can enable vertical and horizontal integration with partner industry standards that includes IATA, ICAO, CANSO and SESAR.

4 Schedule and Submission Instructions

ACI World will attempt to adhere to the following schedule. This schedule may change due to unforeseen circumstances and at the sole discretion of ACI World. Changes will be conveyed to proposers at the earliest opportunity possible via email.

4.1 Schedule

Activity	Latest Date
Request For Proposals Release Date	2 September 2019
Deadline for written RFP Clarifications/Questions	20 September 2019
Responses to questions posted to ACI World website	4 October 2019
Proposals Due	11 October 2019
Oral Presentations/Interviews (If required)	Until 25 October 2019
Proposal Review, Negotiations, Scoring	Until 31 October 2019
Projected Award Date	30 November 2019

4.2 Proposal Submission

Proposals must be received by ACI World, in accordance with the RFP Schedule listed above. Proposals should be sent electronically in PDF format to **Serge Yonke Nguewo Senior Manager Airport IT at** syonkenguewo@aci.aero

Inquiries regarding this proposal may be directed to Airports Council International (ACI) World by electronic mail to : syonkenguewo@aci.aero with "Semantic Model RFP Inquiry" in the subject line. Inquiries must be received by 20th September 2019. Responses to all inquiries received by this deadline will be posted electronically and made publicly available at http://www.aci.aero/About-ACI/Priorities/Airport-IT

Proposals received after the specified date and time above shall be considered late and shall not be considered for award.

5   EVALUATION AND SELECTION

5.1   Evaluation and Selection Process

Proposals submitted in response to this RFP will be evaluated by the Evaluation Committee established by ACI World, in accordance with the criteria and procedures set forth in this Request for Proposal.

The Evaluation Committee will submit its recommendation to the ACI World for an award to be made based upon the Evaluation Committees' determination of the most favourable proposal.

5.2   Evaluation criteria

The following items constitute the evaluation criteria (and their respective weights), which ACI World will use in evaluating proposals submitted in response to this RFP.

1.Qualification of the Firm (Technical) - 20%: Technical experience in performing work of a closely similar nature; experience working with the aviation industry completing work on schedule and within budget; strength and stability of the firm; technical experience and strength and stability of proposed subconsultants; assessments by client references

2.Qualifications and Experience of Team and Key Staff - 25%: Qualifications and experience of staff, key personnel's level of involvement in performing related work.

3.Project and Services Understanding and Methodology – 30%: understanding of the requirements and solution proposed for migration and hosting of the model, ongoing support and maintenance, documentation and training.

4.Cost and Price - 25%: Reasonableness of fixed costs, business model and innovative solutions for ongoing support and maintenance of the model for the benefit of ACI members

Interviews with the proposed firm (Only if required)

5.3   Notification to Successful Proposers

Proposers who remain in the competitive range following the initial evaluation of written proposals may be invited (only if interviews are required) to demonstrate their qualifications, experience and project approach before the Evaluation Committee. There will not be a separate "interview" score. The Evaluation Committee may raise or

lower criteria scores based on information and clarifications gained during the interview process. Reasons for such changes will be documented.
ACI World reserves the right to make an award solely on a proposer's written proposal alone, and is not required to conduct interviews.

5.4 Notification to Unsuccessful Proposers

All proposers shall be notified of ACI World Evaluation Committee's recommendations by way of a Notice of Intent to Award (this will serve as the final committee recommendation) within five (5) working days of said recommendation

6   SEMANTIC MODEL TECHNICAL DESCRIPTION

6.1   Purpose of the ACRIS Semantic Model

Airports Council International (ACI) supports open standards architectures. ACI facilitates the development of open data standards with airports through the Aviation Community Recommended Information Services (ACRIS) Working Group.

The purpose of the proposed ACRIS Semantic Model is to promote an open data strategy and interoperability for the aviation community in general and the airport business in particular.

The ACRIS Semantic Model will enable the production of standard data structures for input into the ACRIS API development process and the production of apps by third parties and aviation stakeholders.

The aviation community will also use the ACRIS Semantic Model to establish collective data sharing arrangements with each other and with other aviation sector stakeholders, most notably airlines.

6.2   ACRIS Semantic Model details

The ACRIS Semantic Model comprises four primary layers, the Language, Knowledge, Data Element Library and Technical Realisation layers.

- The Model is retained in a Sparxsystems Enterprise Architect repository.
- The Model is hosted on a cloud platform. Access details are attached for reference.
- At present, the Model is about 300MB in size. It contains the four layer structure (Language, Knowledge, Data Element Library, Technology Realisations, as well as some reference models). There are approximately thirty domains (i.e. business views on the model). It does not contain data, per se, and so is not high volume. The database structure is highly compact, due to the very efficient way that the model is stored in the database. The database size would be expected to grow over the coming months,but is unlikely to be more than a few GB at most.
- There are three environments, one for each of demo, pre production and production. Each is approx. 300MB.
- Currently there are approximately sixty developers registered with the Model. This number is expected to grow over the coming months.
- At present there are approximately ten connections per day. This is expected to grow

The purpose of the Language layer is to document information about the vocabulary used in different parts of the Airport by business partners including employees of the Airport. The content of this layer may be obtained from several sources including business partner industry models, Airport industry guideline documents, government regulatory documents and strategy documents.
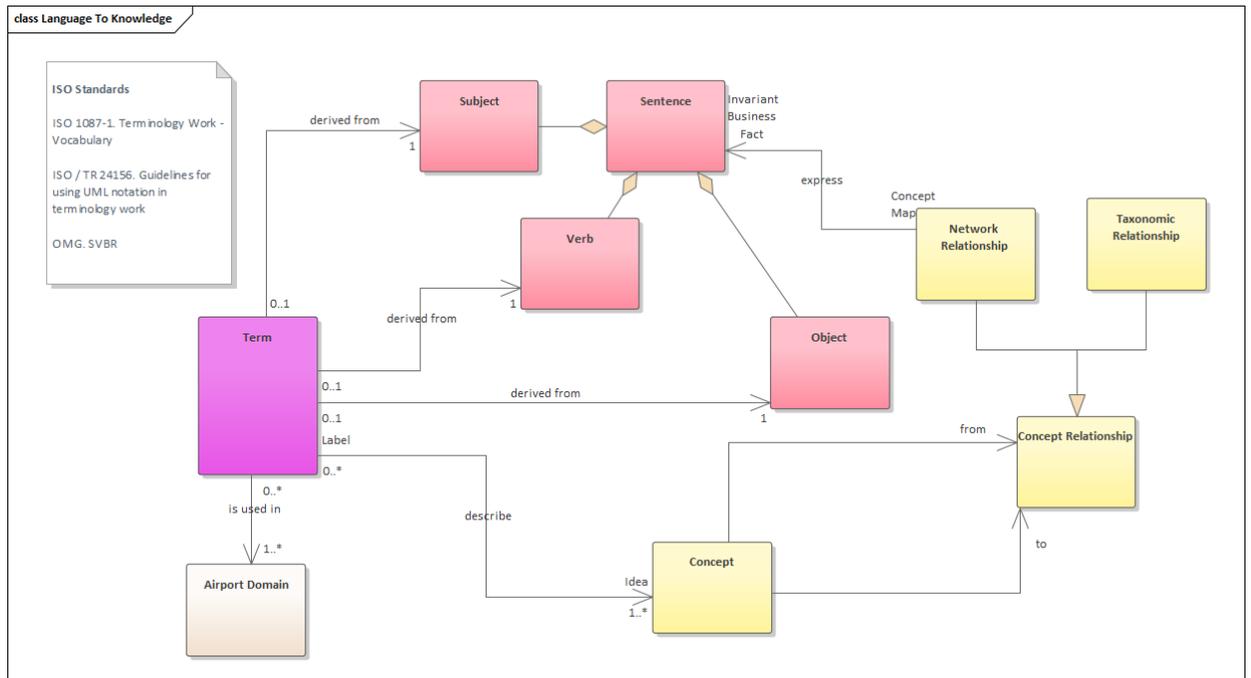

Figure 1. Formal specification for the Language layer elements and their relationships with the Knowledge layer elements

The Knowledge layer holds Airport knowledge made explicit through English statements that are considered to be true or invariant by Airport stakeholders. These statements are said to be statements of facts and are important for understanding the meaning of Airport ideas or concepts. There are two sub-layers in the knowledge layer.
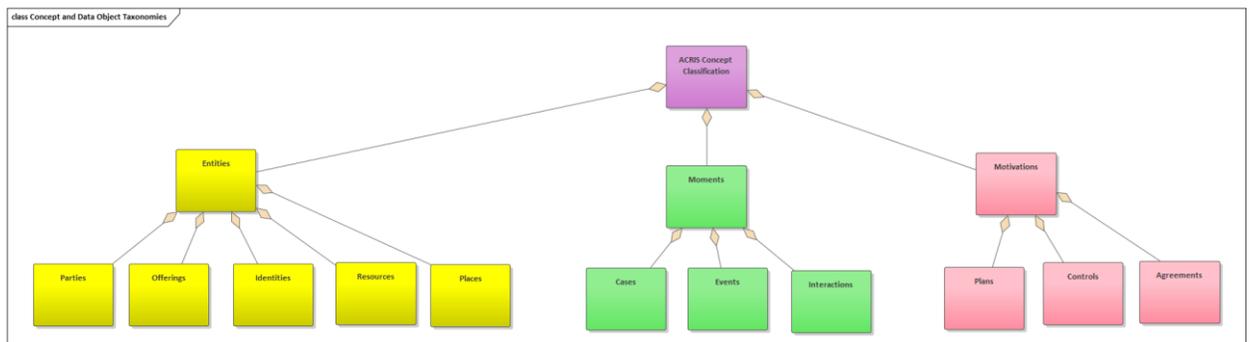
Figure 2. The ACRIS Semantic Model Concept Classification Scheme.

The first sub-layer is known as the "Concept Taxonomy". In this layer, ideas or concepts are organised based on a concept classification scheme that ensures that most concepts in the Airport ecosystem can be related to each other and organised. The second sub-layer uses the organised concepts to document the statements of fact in visualisations known as "Concept Maps". The fact statements represented in these concept maps are based on the OMG SVBR approach. They conform to the class of business rules verbalisation in the class of fact-oriented modeling languages like Fully Communication Oriented Information Modeling (FCO-IM), Object Role Modeling (ORM) and Nijssen Information Analysis Method (NIAM).

A summary of the concepts held in the Knowledge layer is also presented in the form of a blueprint. This concept blueprint supports the planning of data integration projects.
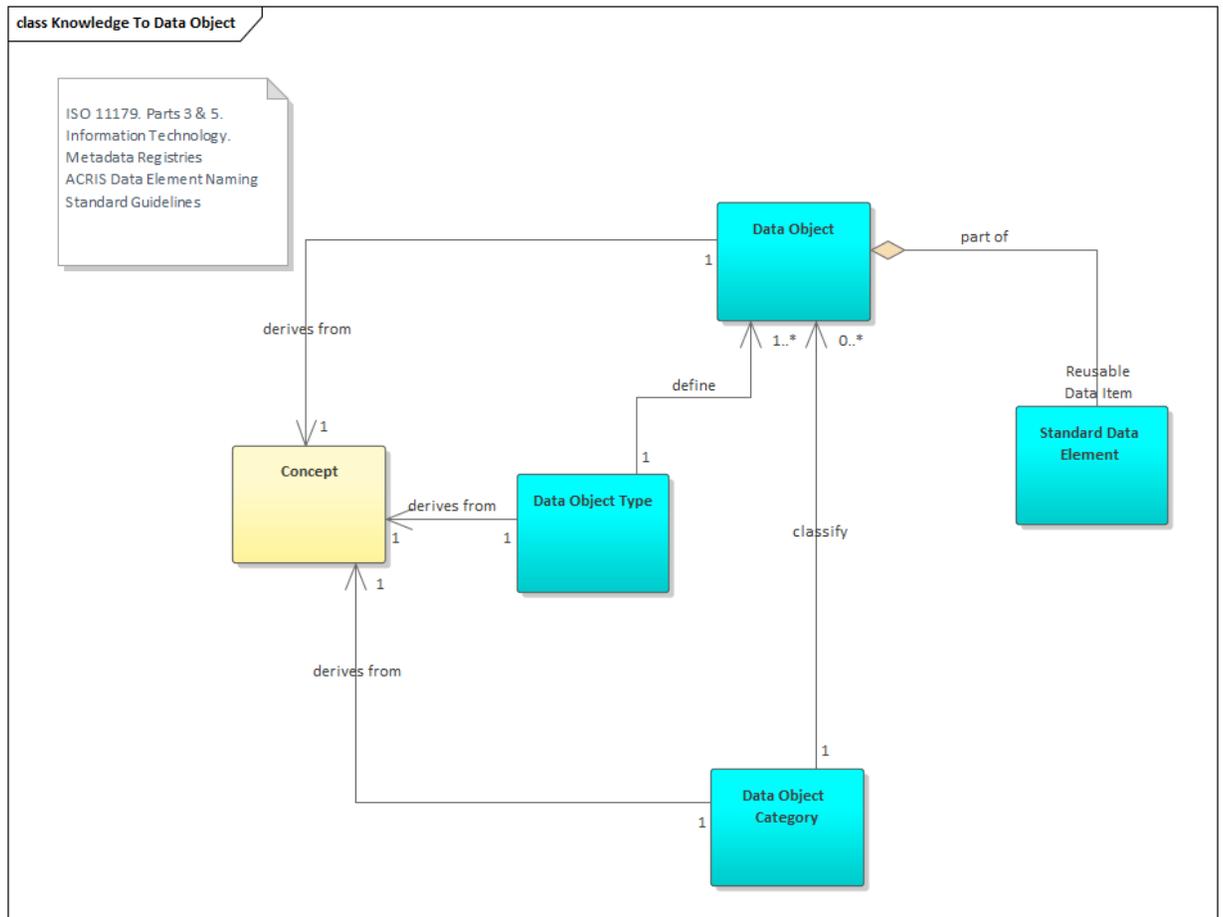

Figure 2. The formal specification of the Data Element Library layer elements.

The Data Element Library layer is also based on the concept classification scheme, the difference is that the hierarchical knowledge structures are flattened to derive data

objects that enable data element standardisation based on the ISO 11179 metadata standard.

The concept classification scheme from the Knowledge layer is used to enable the shared Airport knowledge structures to drive and control Airport ecosystem data standards. For example, a high-level concept like the "Party" in the Knowledge layer and its subtypes are flattened into three data objects in the Data Element Library layer as the "Party", the "Party Type" and the Party Category". The data attributes are standardised as Data Elements as described in ISO 11179 parts 3 and 5.

The Data Element Library layer serves as a repository of data objects and data elements that could be re-used in different project models. The Data Element Library also holds the presentation of the key data objects in a blueprint format to aid data projects development.

The Technical Realisation layer is the location where project context models like "Uses Cases", "Capability Blueprints", "Process Models", "Domain Models" and technology-oriented models like "Relational Data Models", "OWL Schema", "RDF Schema", "XSD Schema" are stored. These models are organised by projects in a sub-layer and named "Project Models". The ACRIS Semantic Model adopted the standards-based Object Management Group (OMG) UML Profiles for these technologies to ensure that all models are transformed to obtain consistent results. The use of these OMG standards ensures that Airports can fully utilise the OMG Model Driven Architecture (MDA) to systems engineering where the application is generated from the models.

This layer also holds reusable models and patterns developed outside the Airport community but reused in the ACRIS Semantic Model. These patterns also allow the airports and partners publish to global United Nations UN/CEFACT standards and open OASIS Universal Business Language (UBL) XML standards. These model templates also enable Airport ecosystem developers use contemporary modeling approaches like the Domain Driven Design (DDD) to derive time-to-market benefits. This sub-layer of the Technical Realisation layer is referred to as Archetypes Patterns and Components layer.

The Technical Realisation layer holds the draft Airport Capability Blueprint which is a generic classification of the business capabilities that any airport may have. A capability is the collection of resources and processes an Airport may deploy to achieve its business outcome. Some business capabilities may be shared by Airport ecosystem partners. The Capability Blueprint is an important input for business and digital transformation especially when used as a library of capabilities in business architecture work based on the OMG VDML Profile in Sparxsystems Enterprise Architect tool.

6.3 Technology Support for the ACRIS Semantic Model

The ACRIS Semantic Model is currently developed in the Sparxsystems Enterprise Architect tool for the following reasons:

a. It supports most Enterprise Architecture frameworks used in the Airport ecosystem including NATO Architecture Framework, Open Group TOGAF, Zachman, OMG UPDM and Open Group ArchiMate which provides Airports the freedom to choose and use any Architecture framework with no constraint. This is important because the goals of an Airport determine its business operating model and strategy hence its choice of Enterprise Architecture framework and so the ACI World does not want to constrain individual Airport innovation.

b. It supports the value-based modeling of shared Airport ecosystem resources including knowledge and business capabilities using the OMG VDML modeling specification. This notation provides Airport ecosystem partners with a bridge for linking their strategies to their business capabilities. They are then able to leverage these identified capabilities to address opportunities and technical risks.

c. It is compliant to most OMG UML Profiles for Enterprise and Solution Architecture, Information Modeling and systems engineering and so offers one of the widest support for digital transformation work.

d. It has the best support for the OMG XMI, the global standards for model exchange which prevents lock-in into supplier products. The developers of the ACRIS Semantic Model have been sharing model information successfully in this and other formats for 8 years.

e. It enables re-use of data objects and so reduces modelling effort.

6.4 Intellectual Property Rights

"Intellectual Property Rights. "Intellectual Property Rights" means all intellectual property rights including current and future registered and unregistered rights in respect of copyright (including rights in software and databases), database rights, designs, circuit layouts, trademarks, patents, inventions and discoveries, rights in confidential information, and all other intellectual property as defined in article 2 of the convention establishing the World Intellectual Property Organisation 1967.

a. All Intellectual Property Rights of the ACRIS Semantic Model are either licensed to or are the property of ACI World.

b. **ACI's name**. ACI's Name, logos and products (ACRIS and Semantic Model) are protected by ACI's exclusive intellectual property rights and cannot be used or reproduced without ACI's prior express written authorization.

7 Proposal Requirements

All proposals must include the following, and be structured as follows:

7.1 Administrative Information

- Cover letter that provides the following information:
  o Name, address, and telephone email of proposer and key contact person.
  o Description of type of business organization
  o A description of technical experience in performing work of a closely similar nature; experience working with the aviation industry completing work on schedule and within budget; strength and stability of the firm; technical experience and strength and stability of proposed subconsultants; assessments by client references.
  o Names and resumes of key staff who will be responsible for the delivery of the project and services.
  o Name of the entity that would sign a contract
- Written Questions
- Information about membership with ACI: With which ACI region
- Assumptions

7.2 Project Methodology

The proposer should clearly define how it will meet the requirements defined in this RFP, including the solution proposed for migration and hosting of the model, ongoing support and maintenance, documentation and training.

7.3 Hosting Arrangements

The proposer should define hosting arrangements for the semantic model either on their own or a third party's systems. The model should be constantly available and should be backed up on at least a daily basis. The model does not perform an operation critical function so does not require 24/7 support.

Proposers should provide details of how the model will be supported and proposals for service level agreements, including time to resolve issues and respond to questions.

7.4 Access to the Model

The model should be available for access through a website. Users should be required to register for access. ACI will approve access requests. Vendors should specify how they will achieve registration and maintenance of secure sign in credentials.

7.5 Documentation of Model

Proposers should describe how they would provide clear documentation of the model for use by the community. Proposals should specify how documentation will be updated and published.

Existing documentation can be found on http://www.aci.aero/About-ACI/Priorities/Airport-IT

7.6 Enhancement of Model

Vendors should specify the process by which they would update the model in accordance with requirements defined by the ACRIS Working Group including resources required and change control processes.

Proposals should specify tools to be used in development of the model. Vendors should document the capabilities of the proposed tool and provide a comparison to the current tool.

7.7 Provision of Training

Vendors will be required to provide training on the use of the model to current and potential users. Proposals should describe how training would be delivered, bearing in mind that many users will be in remote locations and different time zones. Computer base training (e-learning), webinars and face to face training should be considered. Costs to develop and deliver such training should be specified.

7.8 Provision of Support to Users

Vendors will be required to support users on a regular basis who require access to the model and assistance in using it. Access and support for ACI members must be free of charge. (Support for other parties might be chargeable). Support may be required via email or telephone and may be supplied additionally through written instructions and help guides.

Proposals must include details of how day-to-day support will be provided.

8   Business Model

Proposals should include any start-up or fixed costs for migration and initial development, as well as ongoing hosting and support costs.

ACI is a not for profit organization with limited budget. The current hosting, development and support arrangements are via goodwill from ACI's Members. Proposers should therefore consider and propose innovative funding mechanisms, that allow for cost recovery through training and support for the wider aviation community.

ACI anticipates some level of licensing or hosting cost. However, it is a prerequisite that access to the model is free of charge for ACI members.

As use of the Semantic Model grows, it is anticipated that it will become more broadly used by airlines and other stakeholders as the industry standard. Vendors should take this into account when proposing a cost model. The service provider may promote the use of ACRIS and associated training and services by joint agreement with ACI World.

Costs should be specified in Canadian Dollars (CAD).

Appendix A. IT Industry Standards Referenced

OMG Unified Modeling Language (UML) Superstructure
https://www.omg.org/spec/UML/About-UML/

OMG Value Delivery Modeling Language (VDML)
https://www.omg.org/spec/VDML/About-VDML/

OMG Ontology Definition Metamodel (ODM)
https://www.omg.org/spec/ODM/About-ODM/

OMG Business Process Model and Notation V2.0 (BPMN 2.0)
https://www.omg.org/spec/UML/About-UML/

OMG Business Motivation Model (BMM)
https://www.omg.org/spec/BMM/About-BMM/

OMG Semantics of Business Vocabulary and Rules (SVBR)
https://www.omg.org/spec/SBVR/About-SBVR/

Open Group TOGAF
https://www.opengroup.org/togaf

Open Group Archimate 3.0
http://pubs.opengroup.org/architecture/archimate3-doc/

OMG UML Profile for MODAF/DODAF (UPDM)
https://www.omg.org/updm/

NATO Architecture Framework
https://www.nato.int/cps/en/natohq/topics_157575.htm?

ISO 11179. Metadata Registries. Parts 3 & 5
http://metadata-standards.org/11179/

UN/CEFACT Modeling Methodology
https://www.unece.org/cefact/umm/umm_index.html

UN/CEFACT Naming and Design Rules (NDR) V3.0
https://www.unece.org/cefact/xml/xml_index.html

OASIS Universal Business Language (UBL)

http://docs.oasis-open.org/ubl/UBL-2.2.html