

Prototyping SCA Transceiver APIs using a generic reasoner API

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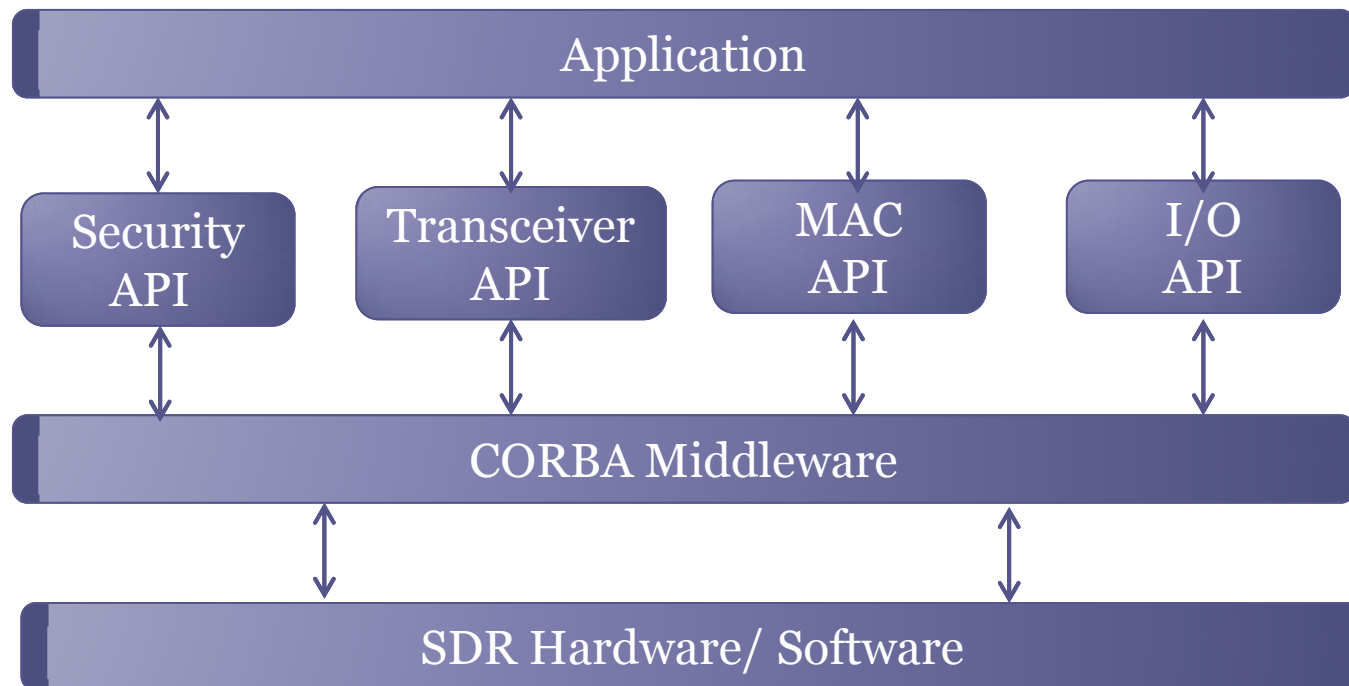




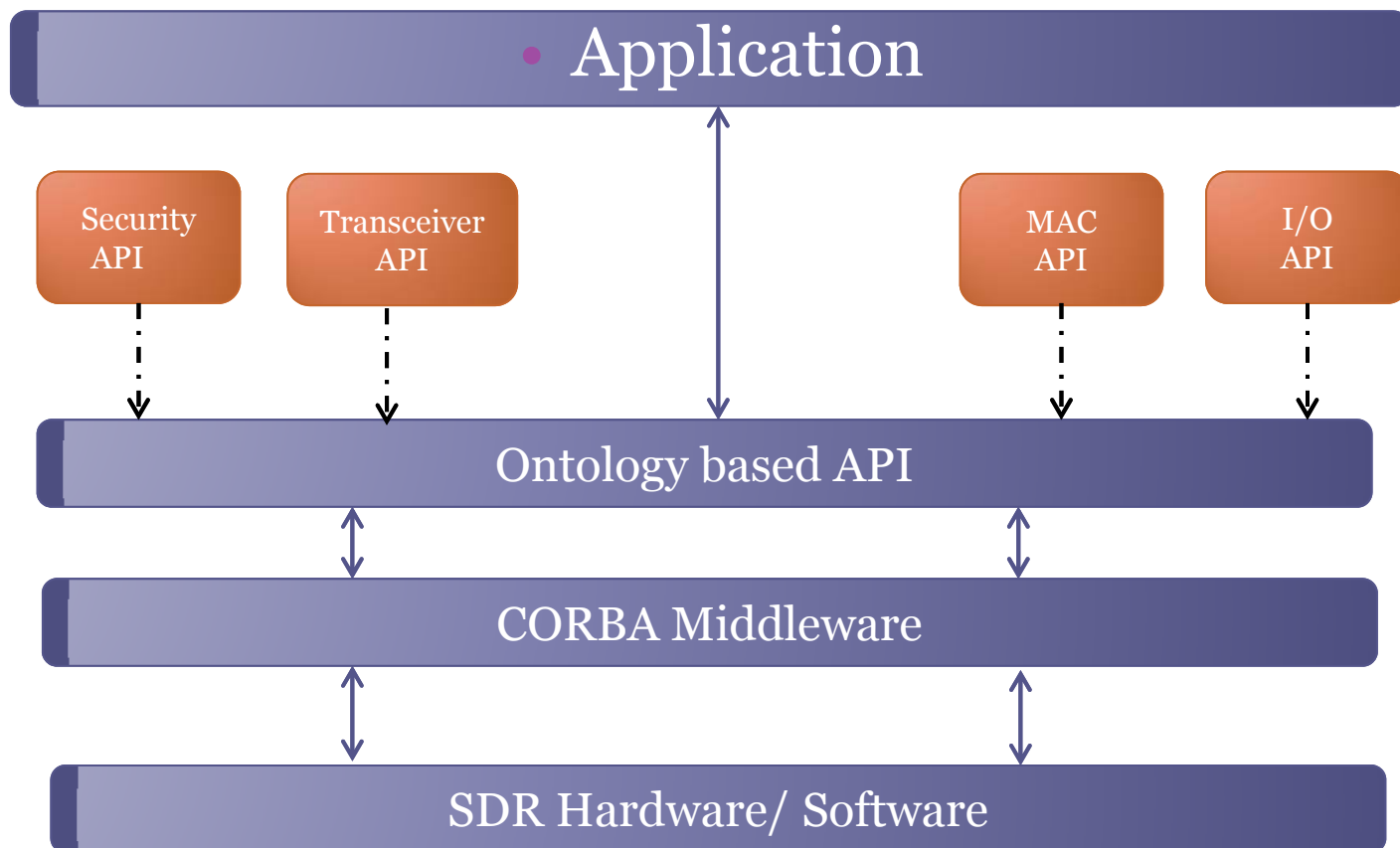
Agenda

- Introduction
- Current Practices
- Our proposal
- Advantages of using OWL
- The Transceiver API
- Checking Consistency
- Querying
- Future Work
- Questions

The Present



What we propose

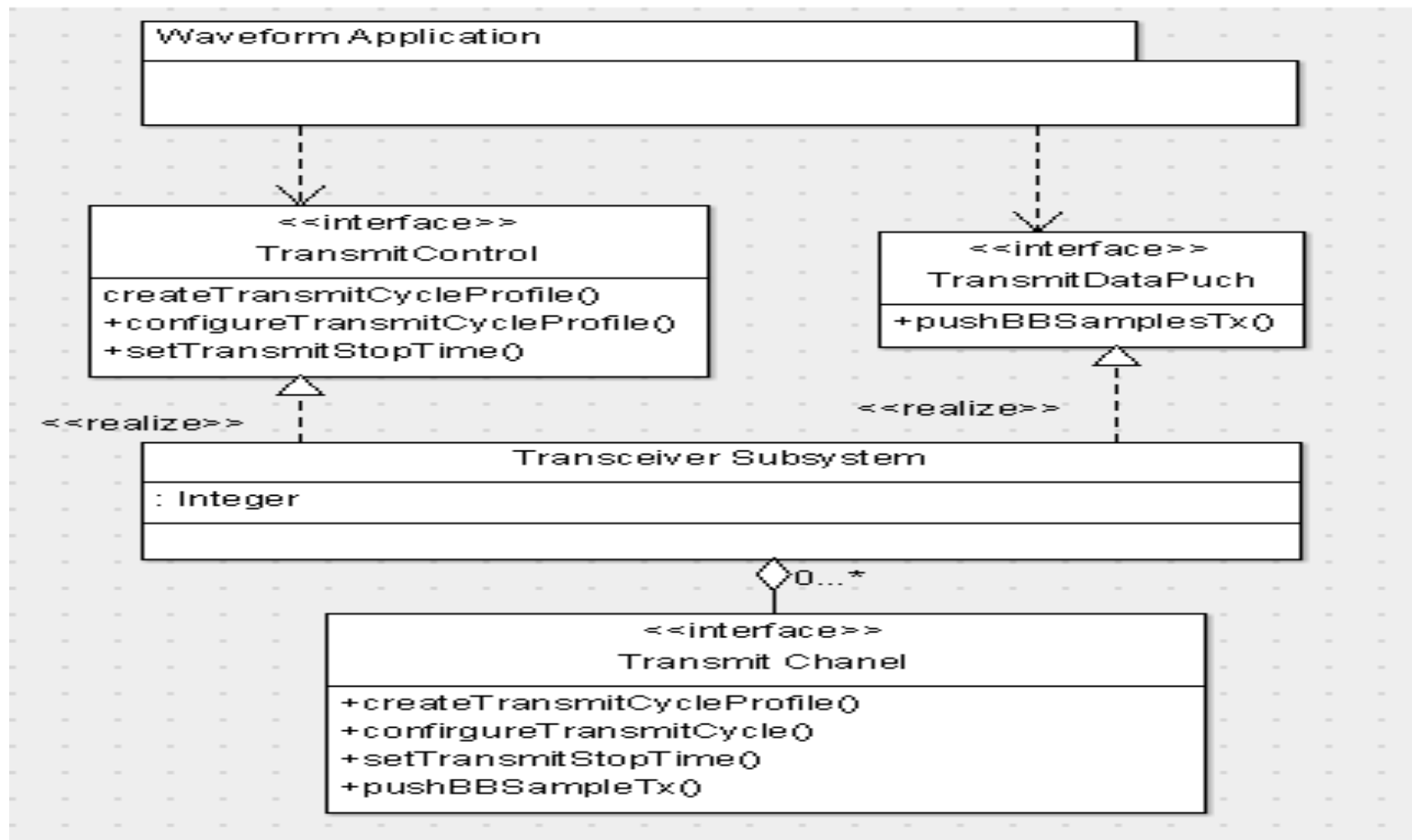




Advantages of using OWL

- OWL lets us use a reasoner
- Checking for consistency is possible
- Querying the specification is feasible

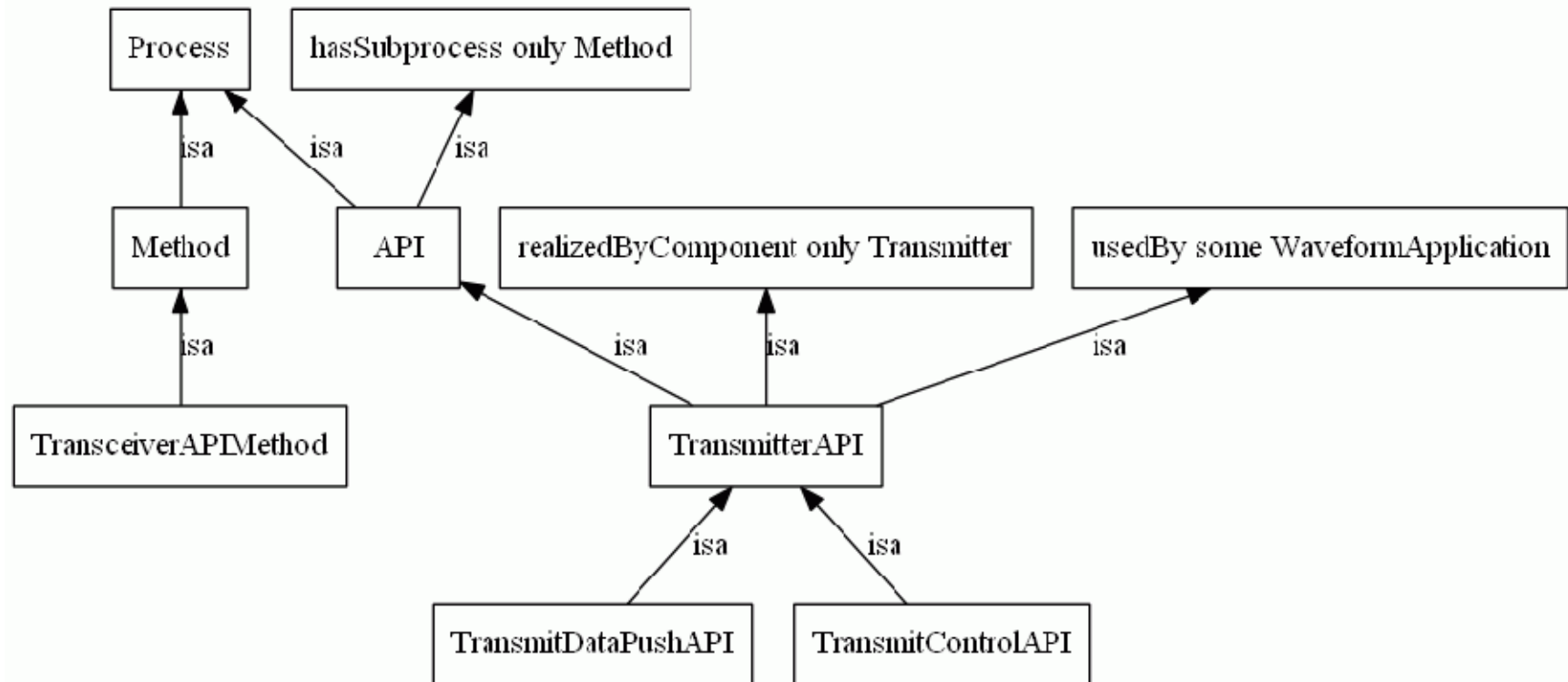
Transceiver API



UML – OWL Mapping

UML Elements	OWL Elements
Class, property owned attribute, type	Class
Instance	Individual
ownedAttribute, binary association	Property
Subclass, generalization	subClassOf, subProperty
N-ary association, association class	Class, Property
Enumeration	oneOf
Disjoint, cover	disjointWith, unionOf
Multiplicity	minCardinality maxCardinality
Package	Ontology
Dependency	Reserved name rdf:Property

UML - OWL Mapping



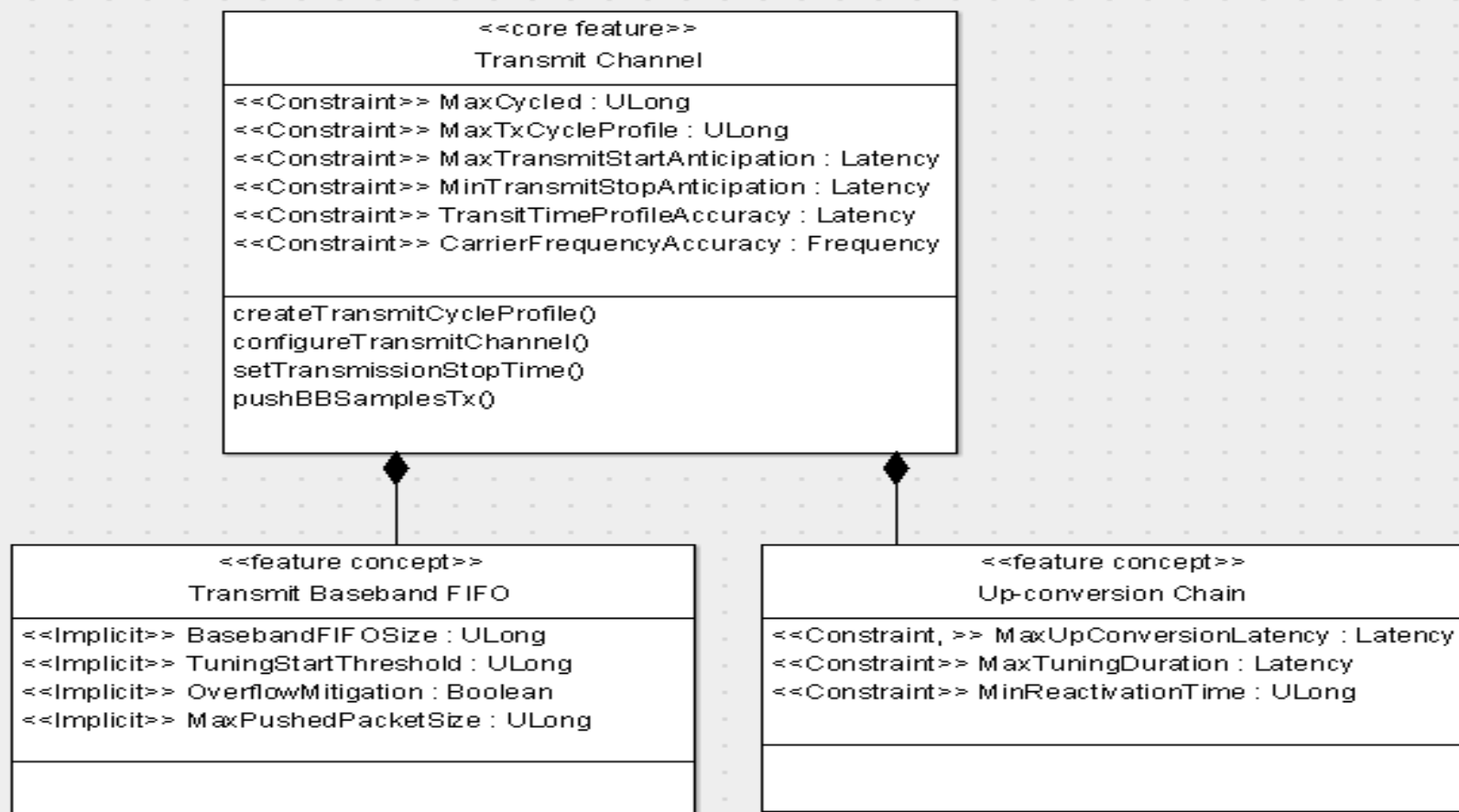
Transceiver API's UML - OWL Mapping

UML Elements	OWL Elements
Waveform Application	Thing -> Object -> Component -> Waveform Application
Transmit Control	Thing -> Process -> API -> TransmitControlAPI
Transmit DataPush	Thing -> Process -> API -> TransmitDataPushAPI
Transceiver Subsystem	Thing -> Object -> Component -> Transceiver
Transmit Channel	Thing -> Object -> Component -> Transmit Channel

Transceiver API's UML - OWL Mapping


UML Association	OWL Property
Dependency	implementsAPI
Association	useAPI
Consistsof	usedBy


Checking for Consistency





Checking for Consistency

Description: TransmitBasebandFIFO


Equivalent classes 


Superclasses 

 **Component**

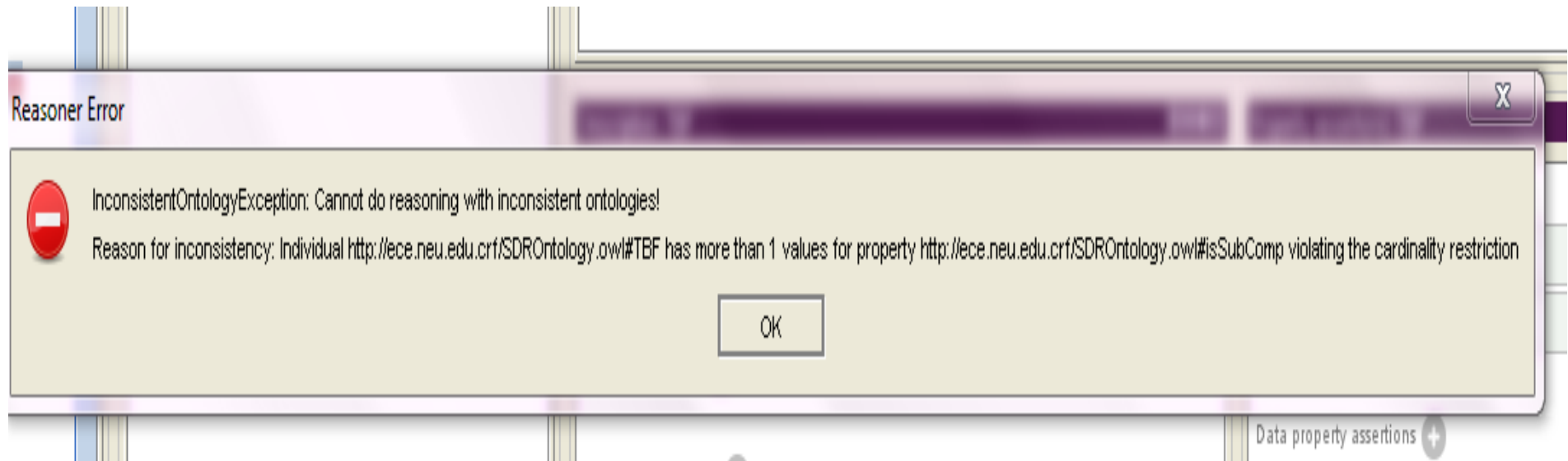
 **isSubComp** **exactly 1** TransmitChannel

Inherited anonymous classes

Members 

 **TBF**

Inconsistency Error Message



Querying the API

- Using SPARQL to write queries
- Sample Query
 - query to return the instances that implement API's, that are in turn used by the Waveform Application object
- Query Syntax

```
# prefix declarations
PREFIX foo: <http://example.com/resources/>
# dataset definition
FROM ...
# result clause
SELECT ...
# query pattern
WHERE {
    ...
}
# query modifiers
ORDER BY ...
```

Query and Result

- SELECT ?C ?A
WHERE { ?C :implementAPI ?A }

Results	
C	A
◆ C2	◆ Y
◆ C1	◆ X



Conclusions

- Advantages of having an Ontology based API, written in OWL in addition to a UML specification
- Automatic testing using a reasoner
- The advantages of complementing the power of UML with that of OWL.



Future Work

- prototyping the various API's of the SCA in OWL,
- checking for inconsistencies in not only the associations but also the dependencies that exist in UML,
- implementation of the single ontology-based API that will allow for mapping any of the existing UML specified APIs to the CRO ontology.

Questions?

Thank you