



# URI-Properties for INSPIRE Extension

Stereotype Solution



# Introduction

- After much effort we have harmonized data models based on standards (ISO, OGC, *INSPIRE*)

But...

- These already being extended based on regional, thematic, domain requirements

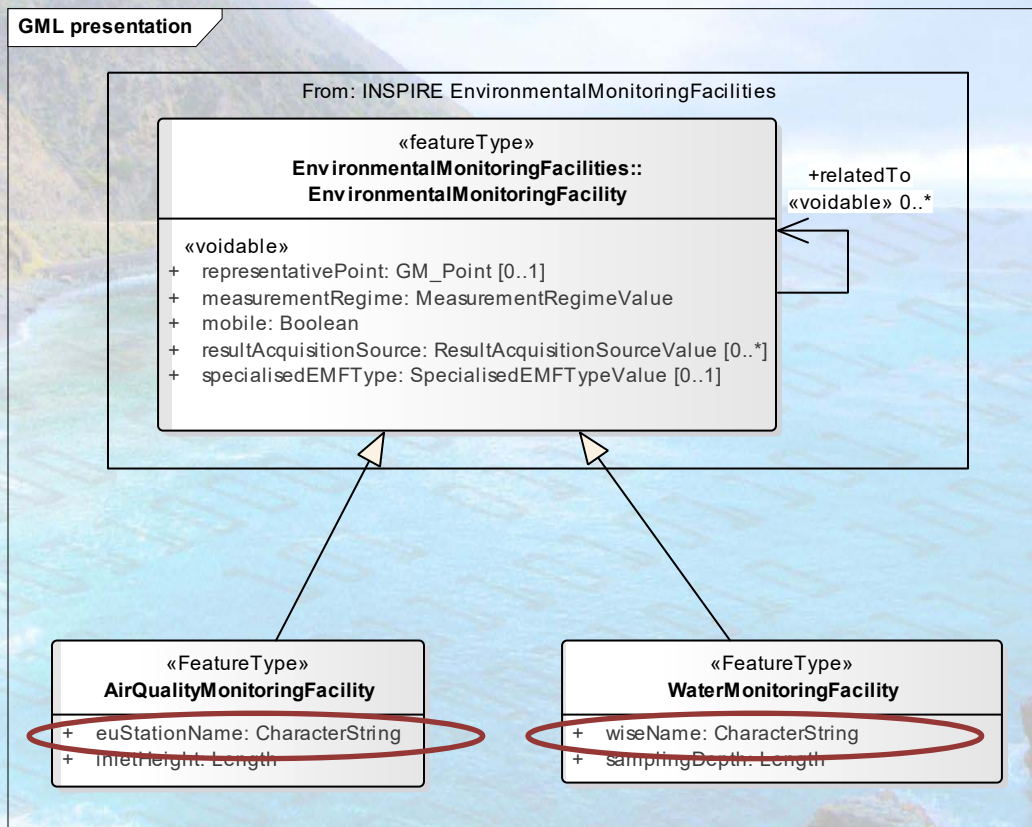
So...

- How to Avoid Standards Based Chaos?

# Requirement for Reusable Properties

- When extending data models, the same concept will be extended differently in different extensions
- No way of determining that actually the same concept
- No way of selectively reusing a new concept from elsewhere

# Outcome Random Extension



# What to do?

- Workshop at ISESS 2015 in Melbourne: Evolution of environmental information models
- Outcome:  
Requirement for reusable URI-Properties

*(See Position Paper (online under Springer) and Workshop Outcomes (link at end))*

# How to do it?

The following approaches were analyzed for feasibility:

- Data Types
- Interfaces
- MOF level adjustment of UML
- Stereotypes

# How to do it?

## Datatypes

- Complex semantic derivation hierarchy difficult to manage
- Same datatype may still be reused for multiple class attributes with subtly different meanings



# How to do it?

## Interfaces

- Visually confusing in UML if too many interfaces present
- All traces of UML interfaces get lost in transformation to XSD





# How to do it?

## MOF level adjustment of UML

- Both attributes and associations have a minimal cardinality of 1 in the MOF definition
- Thus not possible!



# How to do it?

## Stereotypes

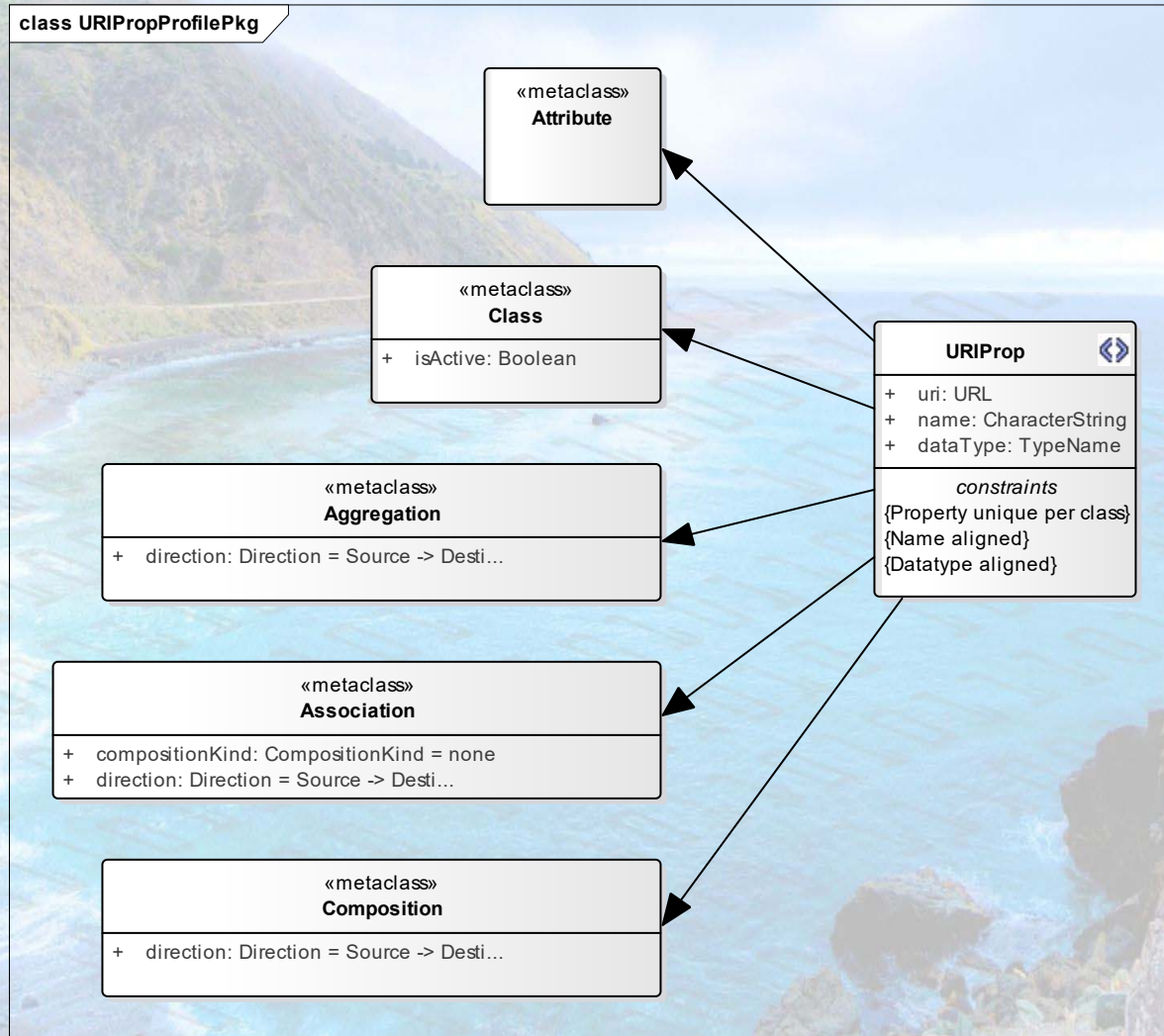
- + Tightly bound with URI
- + Information available in XSD
- + Opens the way to semantic technology



# How to do it?

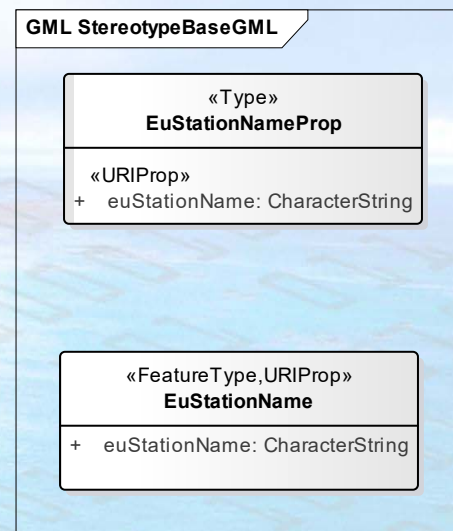
- Create Stereotype defining:
  - **URI:** a unique URI for this property
  - **Name:** the name of the attribute or association role
  - **Datatype:** the datatype of the attribute or of the target of the association
- Add constraints requiring:
  - **Property unique per class:** A URI property can only occur once per class
  - **Name aligned:** The attribute name must be the same as the Name tag of the attribute, which must in turn be the same as that stored for the specified URI Property under the referenced URI
  - **Datatype aligned:** The attribute datatype must be the same as the Datatype tag of the attribute, which must in turn be the same as that stored for the specified URI Property under the referenced URI

# URI Property Profile Package



# URI Property Definition

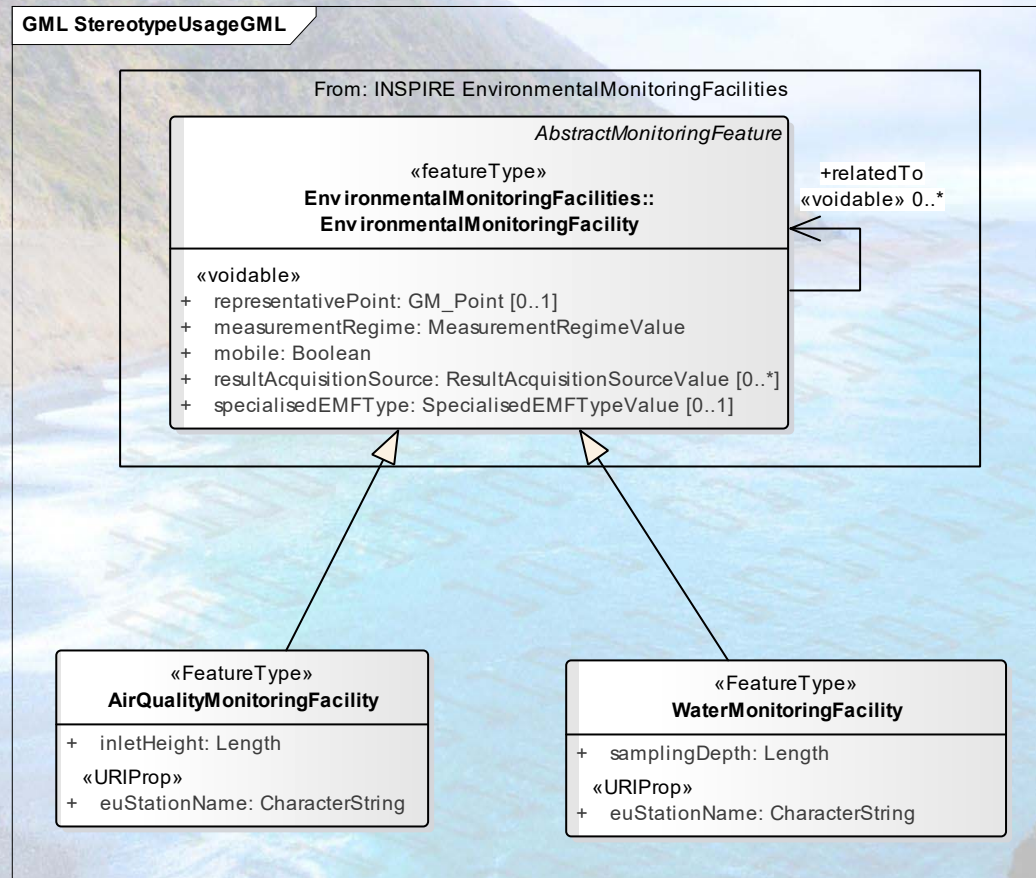
- Simple type as a URI-Property:
- Complex type as a URI-Property:



Tagged Values

URIPropProfilePkg::URIProp (euStationName)	
URI	http://www.props.eu/euStationName
▶ name	"ISO 10646-2", "euStationName", 50, 13
▶ dataType	"CharacterString"

# URI Property Usage



# Transposition XSD

- Implement URI-Property definition as XSD element:

```
<xs:element name="euStationName"  
            type="xs:string" />
```

- When using URI-Property, schema generation requires mapping of property URI to schema URI:

```
http://www.props.eu/euStationName ::  
http://www.props.eu/stereotypeSchema.xsd
```

# Transposition XSD Example

```
<xs:complexType name="AirQualityMonitoringFacilityType">  
  <xs:complexContent>  
    <xs:extension base="ef:EnvironmentalMonitoringFacilityType">  
      <xs:sequence>  
        <xs:element name="inletHeight"  
          type="gml:LengthType"/>  
        <xs:element ref="st:euStationName"  
          up:uri="http://www.props.eu/euStationName"/>  
      </xs:sequence>  
    </xs:extension>  
  </xs:complexContent>  
</xs:complexType>
```



# Transposition XML

```
<stf:AirQualityMonitoringFacility
  xmlns:ef="http://inspire.ec.europa.eu/schemas/ef/4.0"
  xmlns:gml="http://www.opengis.net/gml/3.2"
  xmlns:st="http://www.schleidt.org/schema/st"
  xmlns:stf="http://www.schleidt.org/schema/stFac"
  xmlns:base="http://inspire.ec.europa.eu/schemas/base/3.3"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:xlink="http://www.w3.org/1999/xlink"
  gml:id="AQ_Station1"
  xsi:schemaLocation="http://www.props.eu/stereotypeSchema.xsd">
  <ef:inspireId>
  ...
  <stf:inletHeight uom="m">5</stf:inletHeight>
  <st:euStationName>AT_AQ_Station1</st:euStationName>
</stf:AirQualityMonitoringFacility>
```

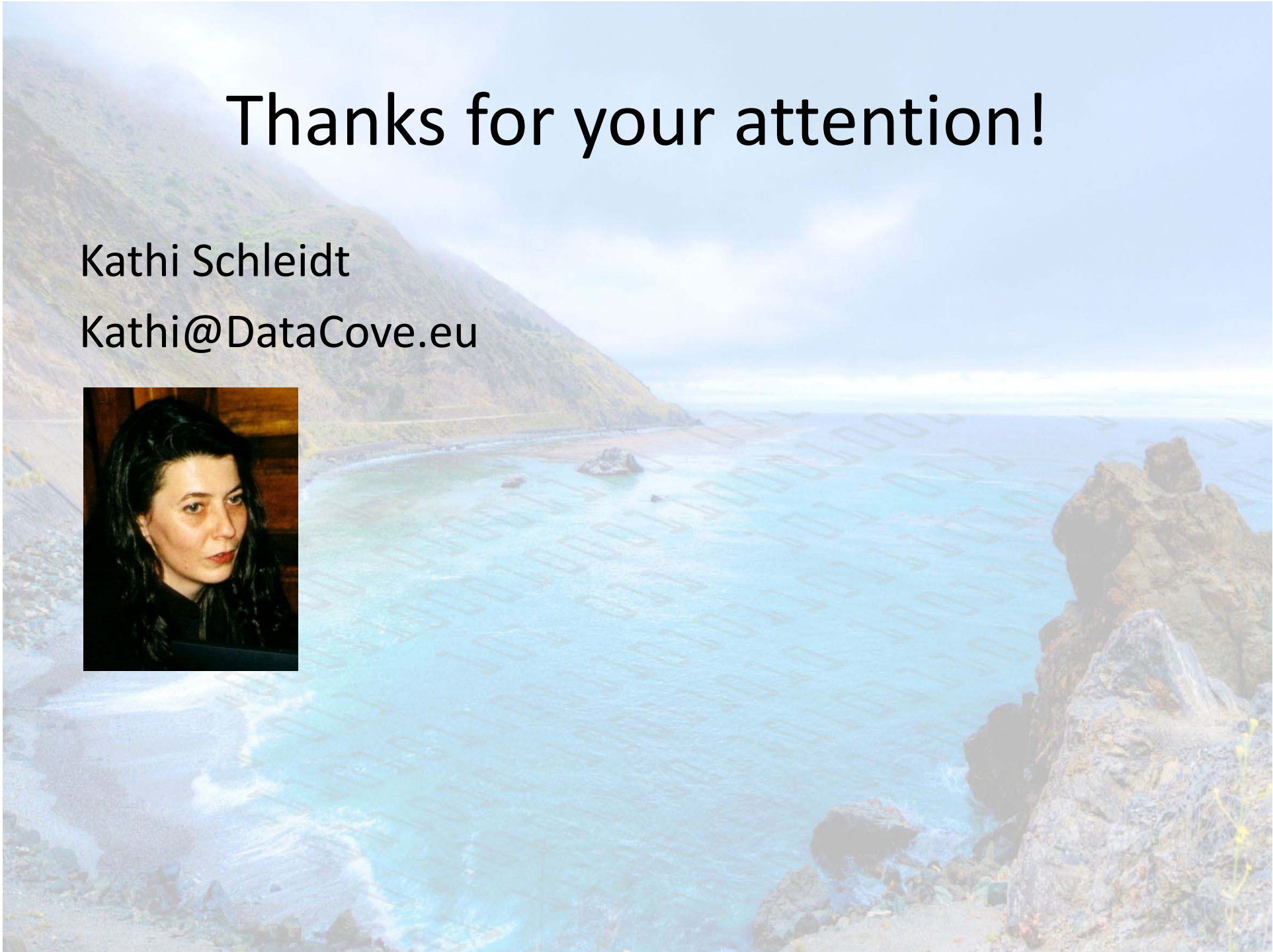
# Conclusions

- Reusable URI-Properties allow for reuse of properties as building blocks
- Can be implemented through the use of stereotypes
- Added Benefit:  
Provides an elegant bridge to semantic technologies

# Thanks for your attention!

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# Links

- ISESS WS Presentations:

[http://www.datacove.eu/docs/Evolution%20of%20Environmental%20Information%20Models\\_ALL.pdf](http://www.datacove.eu/docs/Evolution%20of%20Environmental%20Information%20Models_ALL.pdf)

- ISESS WS Outcomes:

[http://www.datacove.eu/docs/EIM\\_WS\\_Outcomes.pdf](http://www.datacove.eu/docs/EIM_WS_Outcomes.pdf)