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Norwegian standards extending the INSPIRE Network Model

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Norwegian standards extending the INSPIRE Network Model

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- SOSI Road Network 4.6
  - In the SOSI General Feature Catalogue
- SOSI Network and Linear Referencing 5.0
  - In the SOSI Generic Model

Use case:
Data exchange from and to the Norwegian Road Database

The Norwegian Road Database (NVDB)

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- Information about all state, municipal and private roads in Norway
- Road Network
  - Links and nodes
- Linearly referenced features and events

State roads	Regional roads	Municipality roads	Private roads	Forestry roads
10 500 km	44 300 km	38 900 km	91 200 km	48 100 km

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Features and events

- Restrictions
  - *Speed limits, axle load, traffic direction…*
- Other properties
  - *Traffic amount, road width…*
- Physical objects
  - *Signs, man holes, railings…*
- Events
  - *Accidents, slides…*

- NVDB Feature catalogue
  - Ca 370 feature types

Standards based on the INSPIRE Network Model

Why have we created these standards?

- Data exchange from the Road Database to map producers
- Data exchange with municipalities and mapping authorities for maintenance of the Road Database

Infrastructure for Spatial Information in Europe

INSPIRE Road Transport Networks

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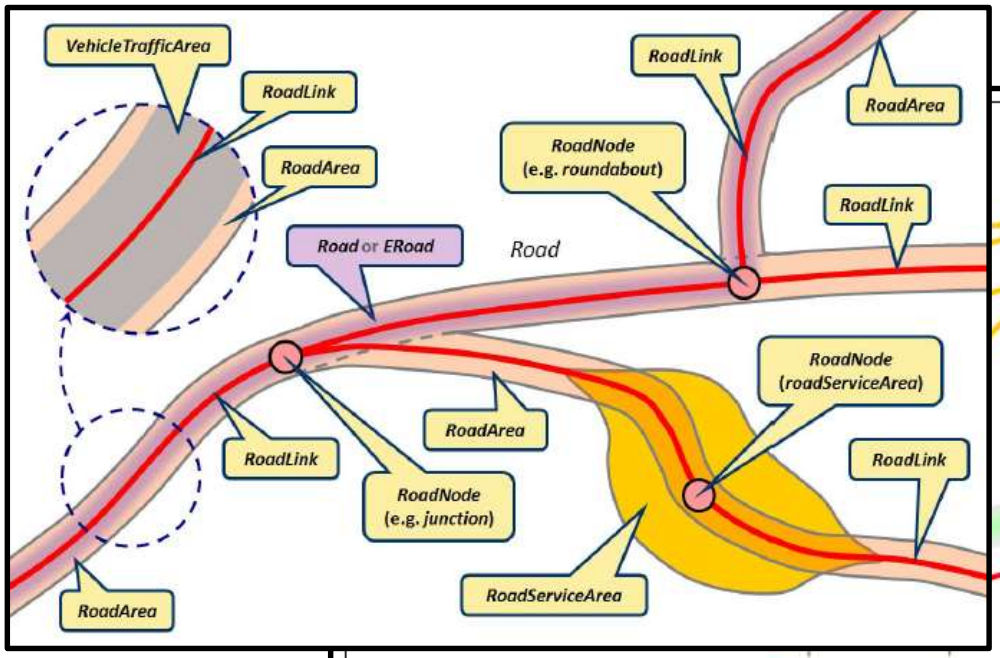
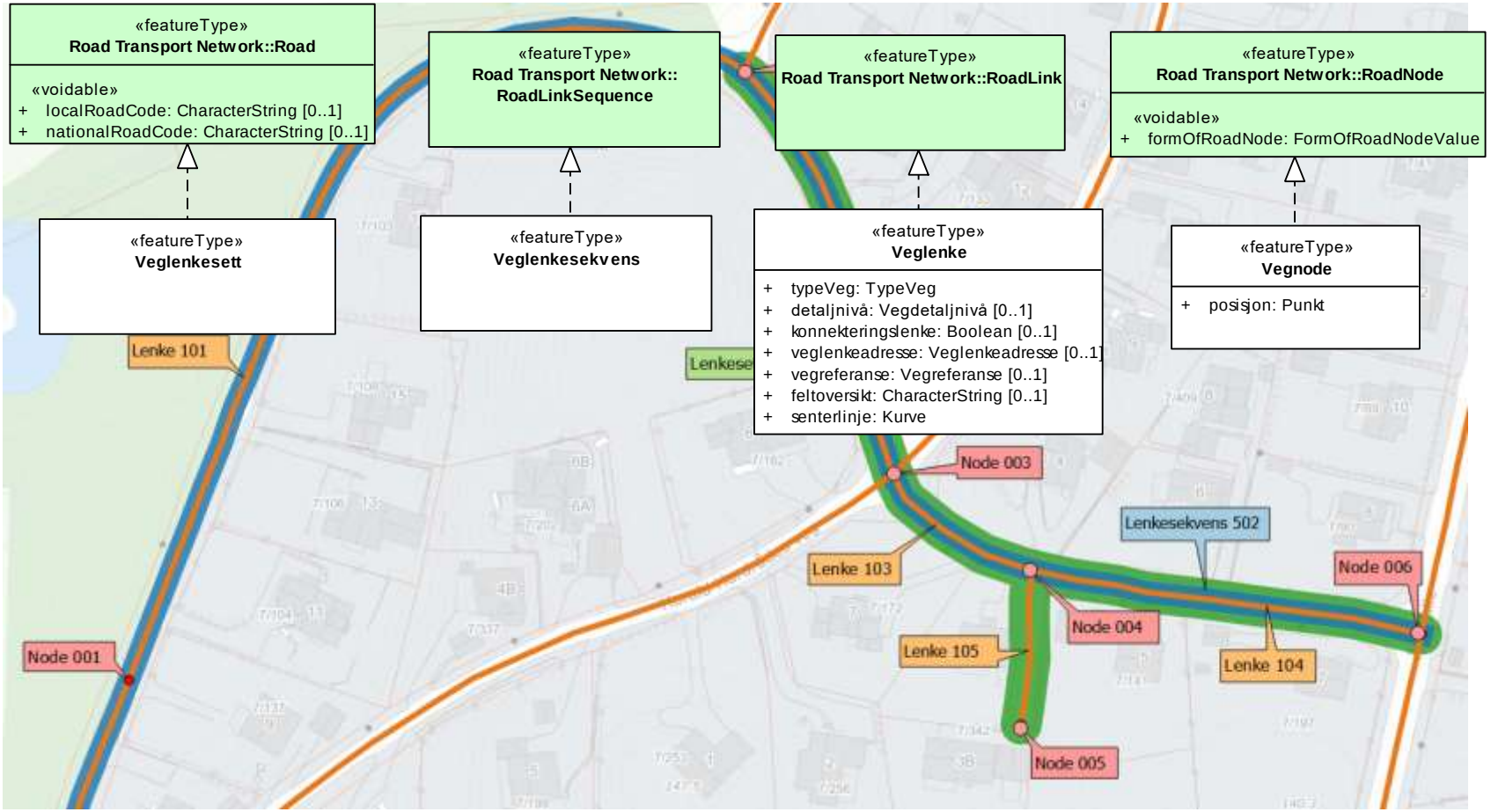


INSPIRE - Infrastructure for Spatial Information in Europe

Extending INSPIRE Transport Networks

SOSI Road Network 4.6



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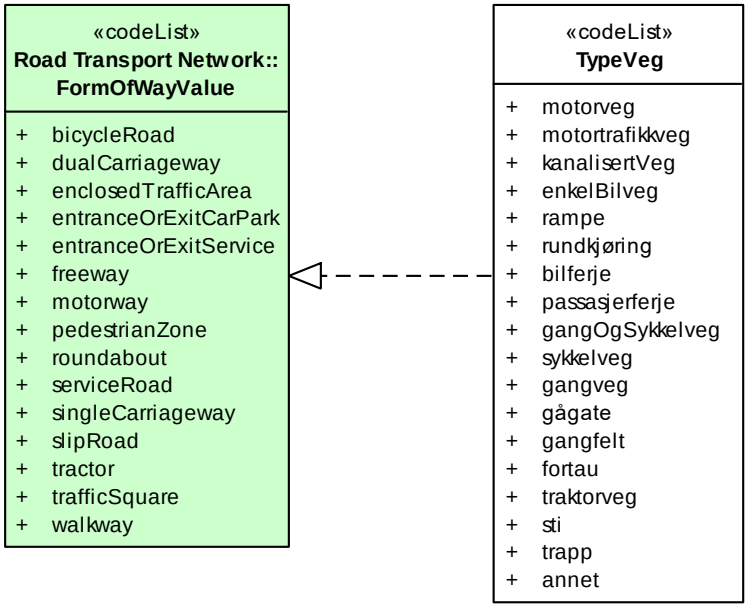
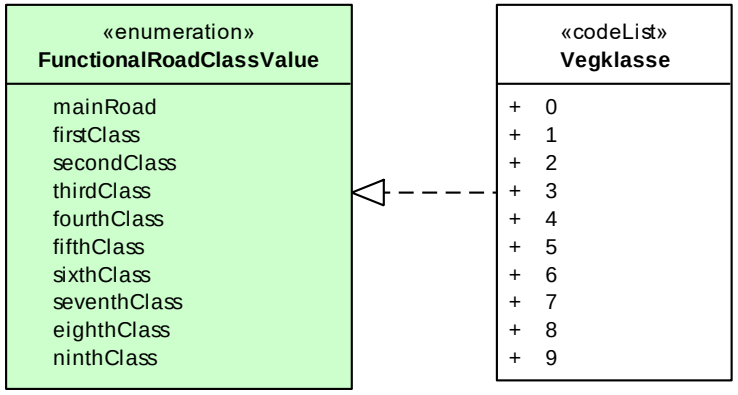
Two important Network Properties

FormOfWay and FunctionalRoadClass

Classification based on the physical properties of the road link.



This classification is based on the importance of the role that the road performs in the road network



- In SOSI Road Network, «typeVeg» is an attribute on the road links, not a feature type
- Functional Road Class is a feature type in NVDB

Connection to INSPIRE

Detailed realization

7.2 Detaljert realisering

De enkelte elementene i modellen forholder seg til modellen INSPIRE Transport Networks som vist i Tabell 2.

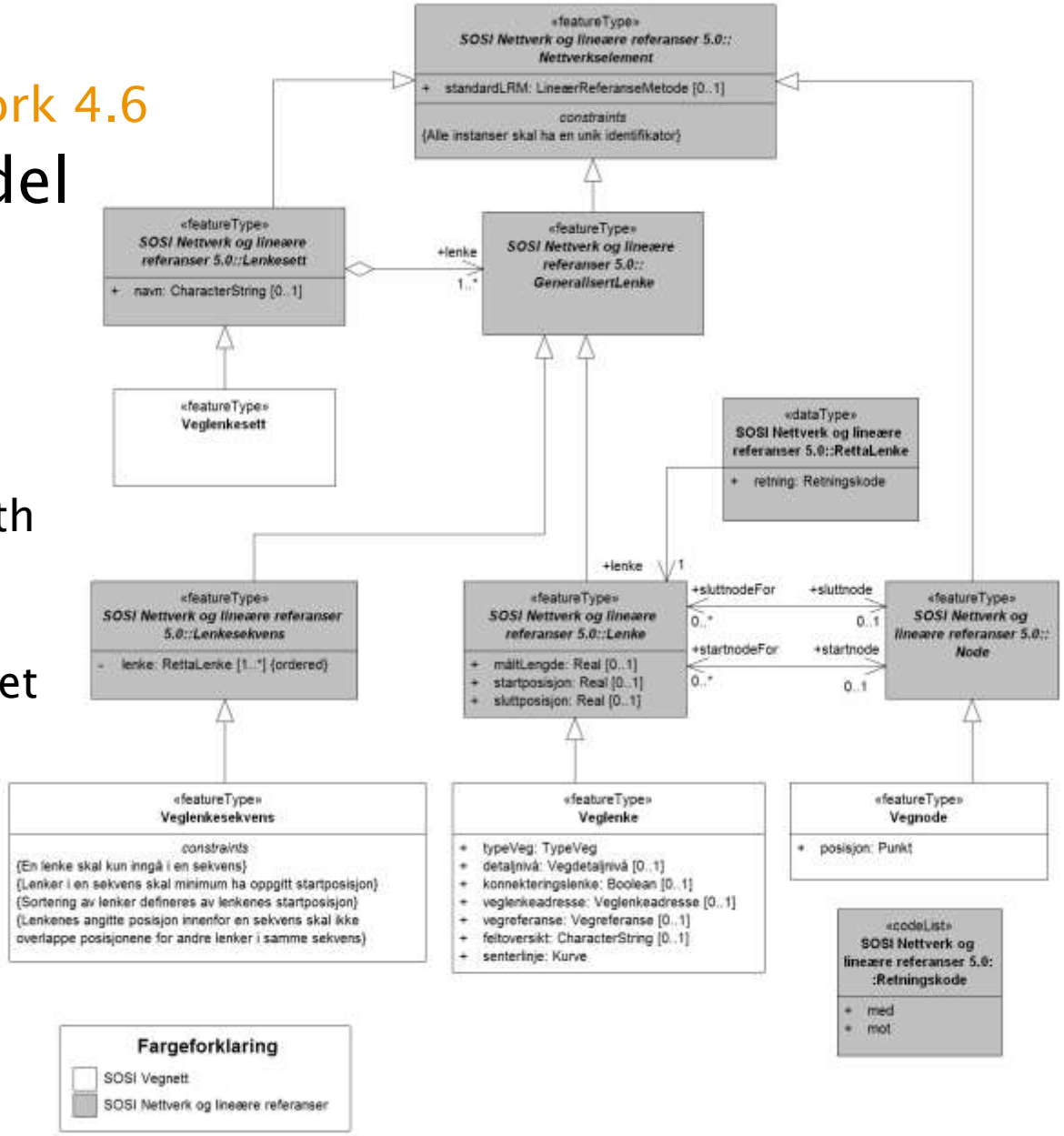
SOSI		INSPIRE		
Type element	**Elementnavn**	**Type element**	**Elementnavn**	**Kommentar**
Objekttype	Veglenkesett	Objekttype	Ro	
Objekttype	Veglenkesekvens	Objekttype	Ro	
Objekttype	Veglenke	Objekttype	Ro	
Egenskap	Veglenke.typeVeg	Objekttype	For	
Egenskap	Veglenke.detaljnivå			
Egenskap	Veglenke.konnekteringslenke			
Egenskap	Veglenke.veglenkeadresse	Objekttype	Th	
Egenskap	Veglenke.vegreferanse			
Egenskap	Veglenke.feltoversikt			
Objekttype	Vegnode	Objekttype	RoadNode	
Kodeliste	Typeveg	Kodeliste	FormOfWayValue	
Kodelisteverdi	motorveg	Kodelisteverdi	motorway	
Kodelisteverdi	motortrafikkveg	Kodelisteverdi	freeway	
Kodelisteverdi	kanalisertVeg	Kodelisteverdi	dualCarriageway	
Kodelisteverdi	enkelBilveg	Kodelisteverdi	singleCarriageway	
Kodelisteverdi	rampe	Kodelisteverdi	slipRoad	
Kodelisteverdi	rundkjøring	Kodelisteverdi	roundabout	
Kodelisteverdi	bilferje	Kodelisteverdi	FeatureType=FerryUse, FerryUseValue=cars	Tilhører Water Transport Networks
Kodelisteverdi	passasjerferje	Kodelisteverdi	FeatureType=FerryUse, FerryUseValue=passengers	Tilhører Water Transport Networks
Kodelisteverdi	gangOgSykkelveg	Kodelisteverdi	bicycleRoad	
Kodelisteverdi	sykkelveg	Kodelisteverdi	bicycleRoad	
Kodelisteverdi	gangveg	Kodelisteverdi	walkway	
Kodelisteverdi	gågate	Kodelisteverdi	pedestrianZone	
Kodelisteverdi	gangfelt	Kodelisteverdi	walkway	
Kodelisteverdi	fortau	Kodelisteverdi	walkway	
Kodelisteverdi	traktorveg	Kodelisteverdi	tractor	
Kodelisteverdi	sti			Finnes ikke
Kodelisteverdi	trapp			Finnes ikke
Kodelisteverdi	annet			Finnes ikke

Tabell 2 Realisering av INSPIRE Road Transport Networks

SOSI Road Network 4.6

Network Model

- Based on SOSI Network and Linear Referencing 5.0
- Roadlink (Veglenke) with the most important attributes
- Other features connectet by linear referencing



Network Model

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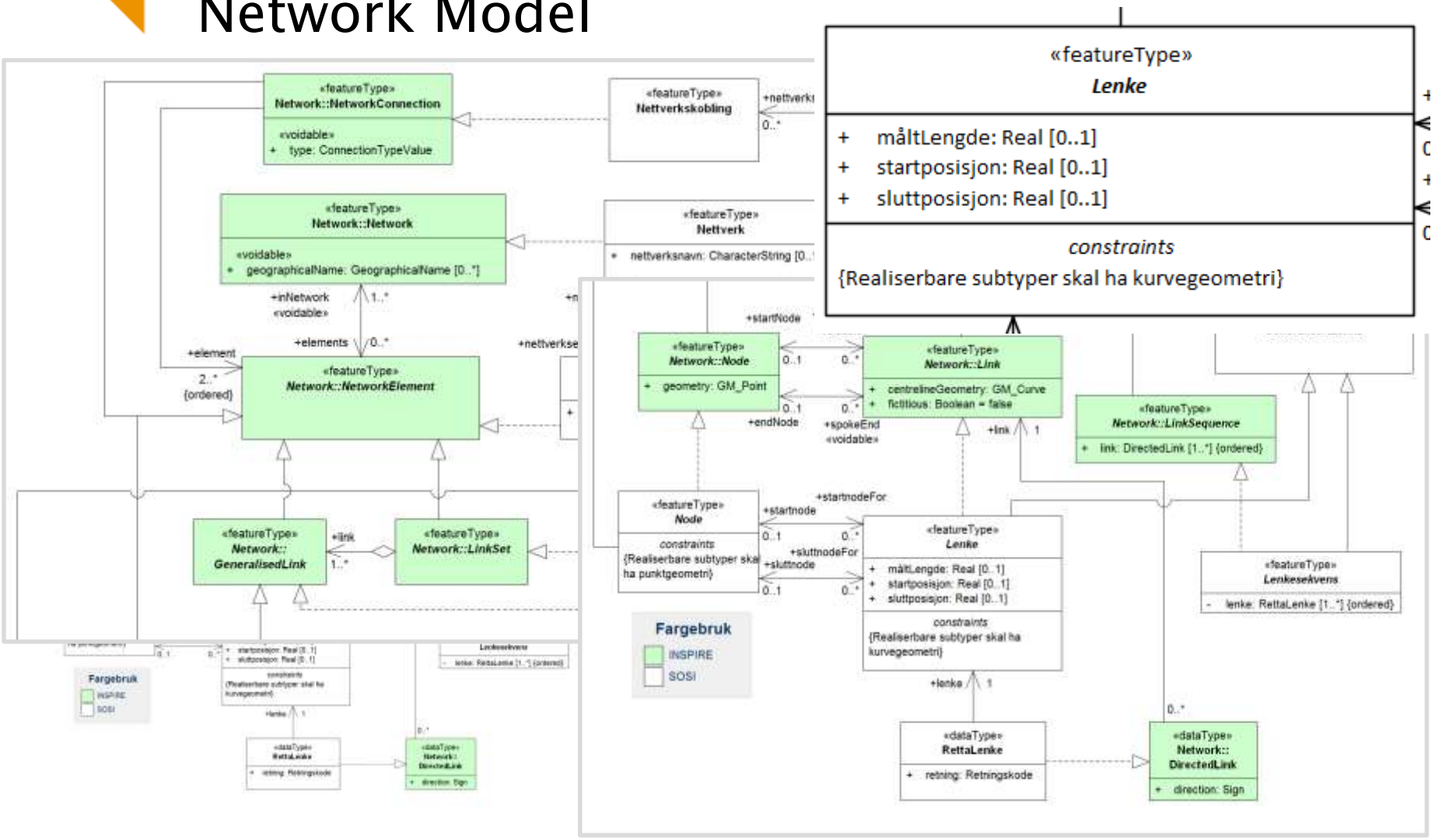

Linear Referencing

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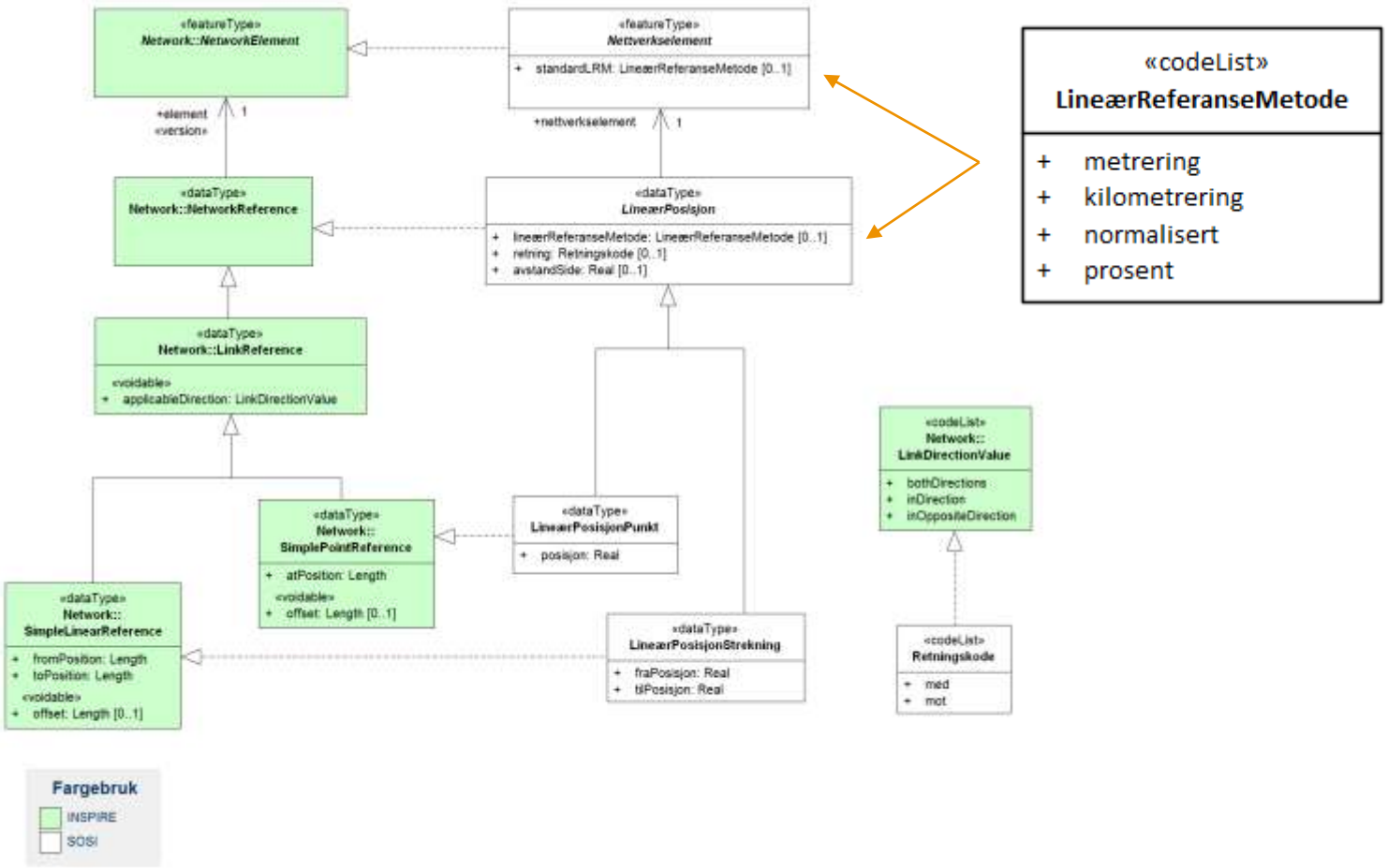

Realization of both INSPIRE and ISO19148

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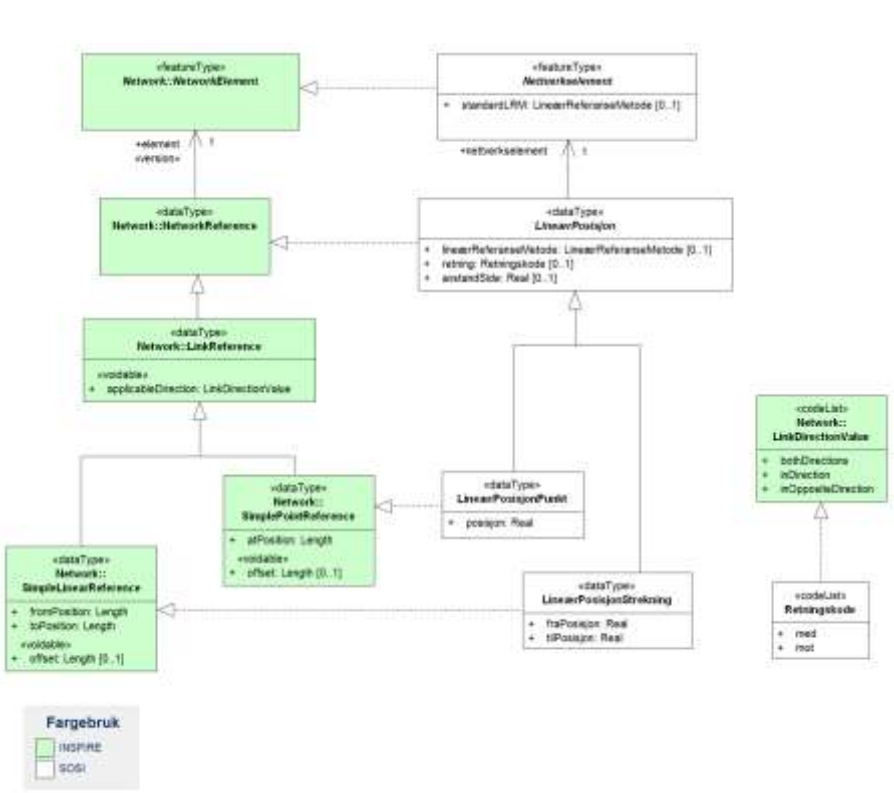
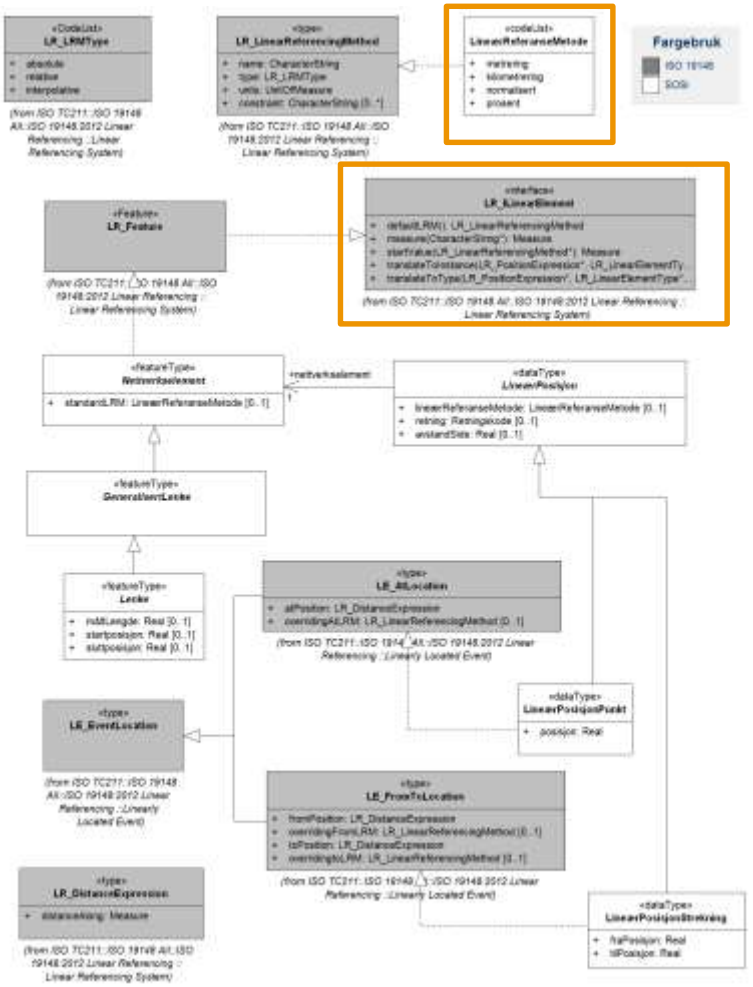
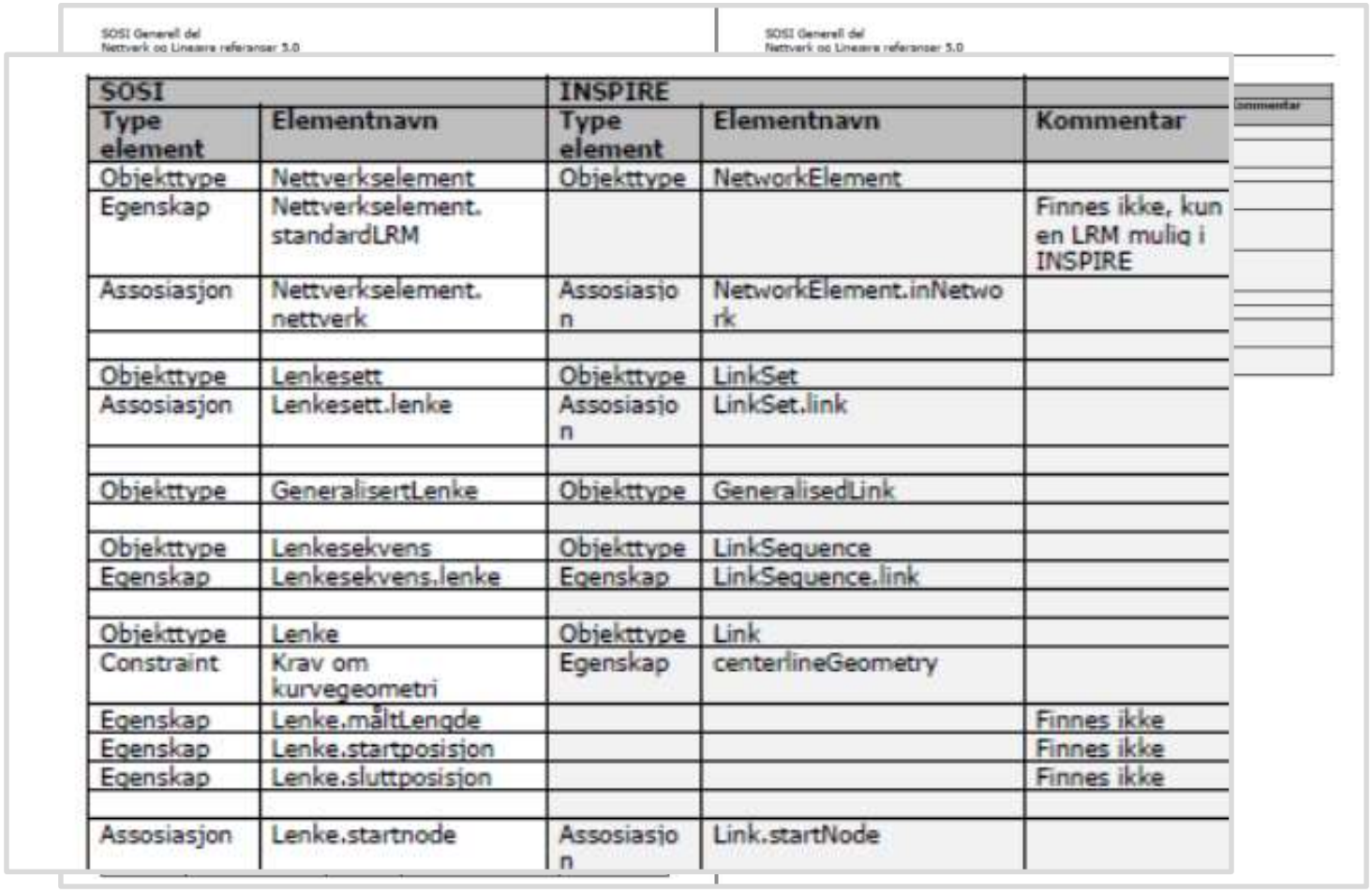




Detailed Realization



SOSI		INSPIRE		
Type element	Elementnavn	Type element	Elementnavn	Kommentar
Objekttype	Nettverkselement	Objekttype	NetworkElement	
Egenskap	Nettverkselement. standardLRM			Finnes ikke, kun en LRM mulig i INSPIRE
Assosiasjon	Nettverkselement. nettverk	Assosiasjon	NetworkElement.inNetwork	
Objekttype	Lenkesett	Objekttype	LinkSet	
Assosiasjon	Lenkesett.lenke	Assosiasjon	LinkSet.link	
Objekttype	GeneralisertLenke	Objekttype	GeneralisedLink	
Objekttype	Lenkesekvens	Objekttype	LinkSequence	
Egenskap	Lenkesekvens.lenke	Egenskap	LinkSequence.link	
Objekttype	Lenke	Objekttype	Link	
Constraint	Krav om kurvegeometri	Egenskap	centerlineGeometry	
Egenskap	Lenke.måltLengde			Finnes ikke
Egenskap	Lenke.startposisjon			Finnes ikke
Egenskap	Lenke.sluttposisjon			Finnes ikke
Assosiasjon	Lenke.startnode	Assosiasjon	Link.startNode	

TN-ITS – CEN/TC278 PT1703

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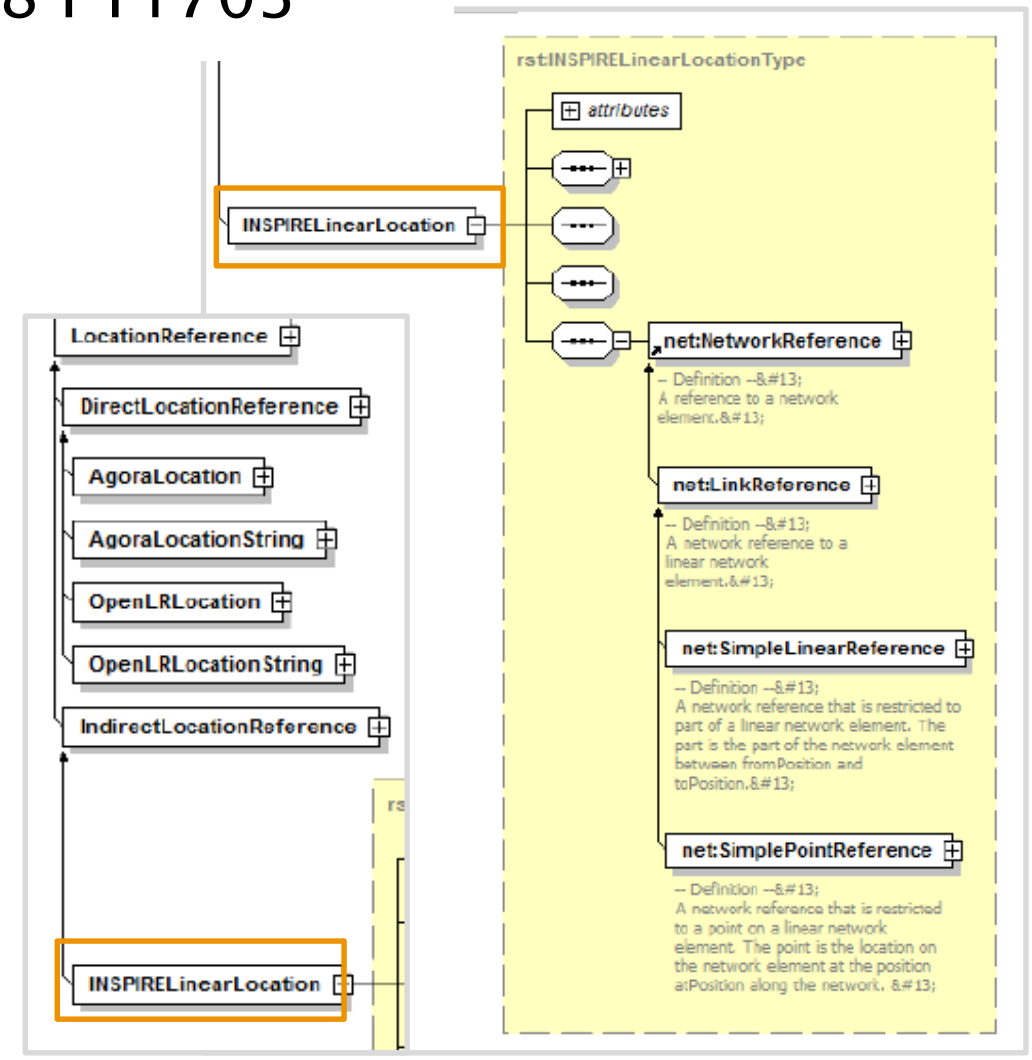
- Locating features on INSPIRE Transport Network Links

TN-ITS helps road users get fresh map data from the road operators to the vehicle's navigation system



Need for revision of the INSPIRE Network Model

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https://themes.jrc.ec.europa.eu/discussion/view/13413/update-of-the-inspire-network-model

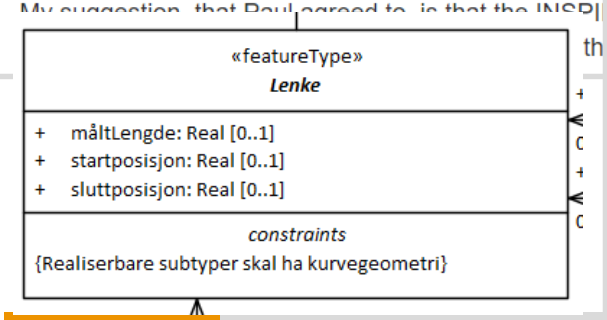
First - on linear referencing:

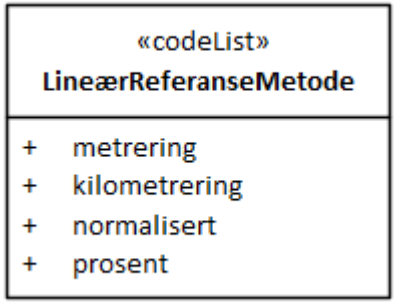
Linear Referencing is an important part of INSPIRE Transport Networks, and is based on the Generic Network Model (D.2.10.1). There is also an international standard for linear referencing of geographic information: ISO 19148:2012. On page 5 in the D.2.10.1 document, the relation to ISO19148 is described like this:

"*ISO/TC 211 has been developing a standard (ISO19148). A mechanism to express linear references is provided in this version of the network model in the sense of a "candidate type" that may require an update once ISO19148 is stable and supported by implementations.*"

ISO19148 was published in 2012, so one may very well say that it is stable. It is also supported by a number of implementations, including GML 3.3. I have discussed this with Paul Scarponcini, who was the editor for ISO19148, and his conclusion is that there is no discrepancy between the INSPIRE model for linear referencing and ISO19148, INSPIRE is just narrowing ISO19148 by having only one LR Method (absolute – length on geometry). But the model should still be updated, to show the connection to ISO19148. And I also think it should be possible to use interpolative LR methods (0..1 or percentage) as an alternative to geometry length, and maybe also relative methods (length from milepost etc). This would significantly simplify our delivery from the Norwegian Road Database.

My suggestion, that Paul agreed to, is that the INSPI





Second - road link positions on road sequences:

Another issue with the INSPIRE Network Model is that we should have from- and to position attributes (and/or length) on the link features, to describe where they are in a link sequence and how long they are in the LR system. This is also supported in ISO19148.

The fact is that each link may have an individual scale in the LR system. In our road database, the features are positioned on the link sequences, while the links have from- and to positions on the link sequences. These positions may differ from the geometry length. The link features also hold the road geometry. To present the features with geometry on a map, we need to go from linear references to road geometry, and the scale for each link is a parameter in this process.

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Experiences

- To be discussed:
  - How to model the local adaptions
    - Realization or subtyping
    - Extension or profile
  - How to model detailed realizations
- Need for revision of the INSPIRE Network Model
  - https://themes.jrc.ec.europa.eu/discussion/view/13413/update-of-the-inspire-network-model