

# 313 Data Models and Architectures

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# Theme and Outline

## *Theme of presentation*

- Application of standards, methods and tools for the development and use of data models and architectures within the domain of road transport networks

## *Outline of presentation*

- Business and IT
- Trends in business and IT
- Model driven architecture
- Data modelling (INSPIRE)
- Governance
- Concerns

# Business and IT

## *Business*

### Responsibility

- Constructs, operates and maintains the State road network
- 5 % of the Danish road network – 45 % of the Danish road traffic

### Application domains

- Planning of road network
- Construction, operation and maintenance of road network
- Traffic management and information

## *IT*

### Types of applications

- *Administrative*
- Persistent data, driven by users
- Examples:
  - Road network administration (vejman.dk)
- *Real-time*
- Transient data, driven by external events
- Examples:
  - Traffic management applications
  - Monitoring and dispatch (Trafikman)

# Trends

## *Business*

**Business is digital**

**Business is dynamic**

**Data are shared**

**More data**

- more and different sources
- more and different customers

**More interaction**

- more and different users and stakeholders

## *IT*

**From silos to integrated services**

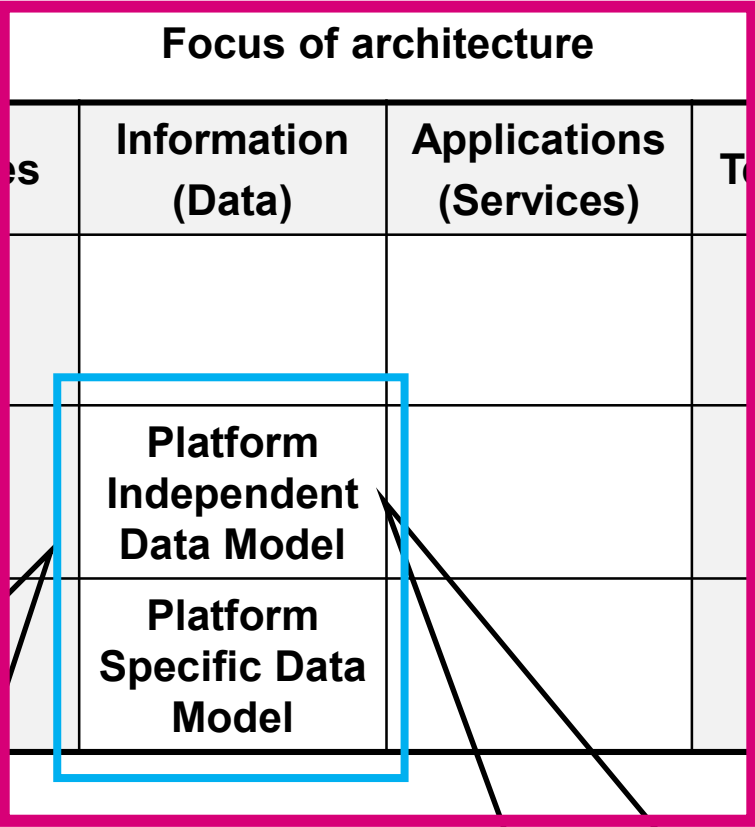
- Secure
- Flexible (business, technology)
- Interoperable
- Reusable
- Cost-effective (across service life-cycle)

**Architectural framework**

- Enterprise architecture
- Service orientation
- Standardisation

# Model Driven Architecture

	Strategy	Processes	Information (Data)	Applications (Services)	Technology
Conceptual					
Logical			Platform Independent Data Model		
Physical			Platform Specific Data Model		

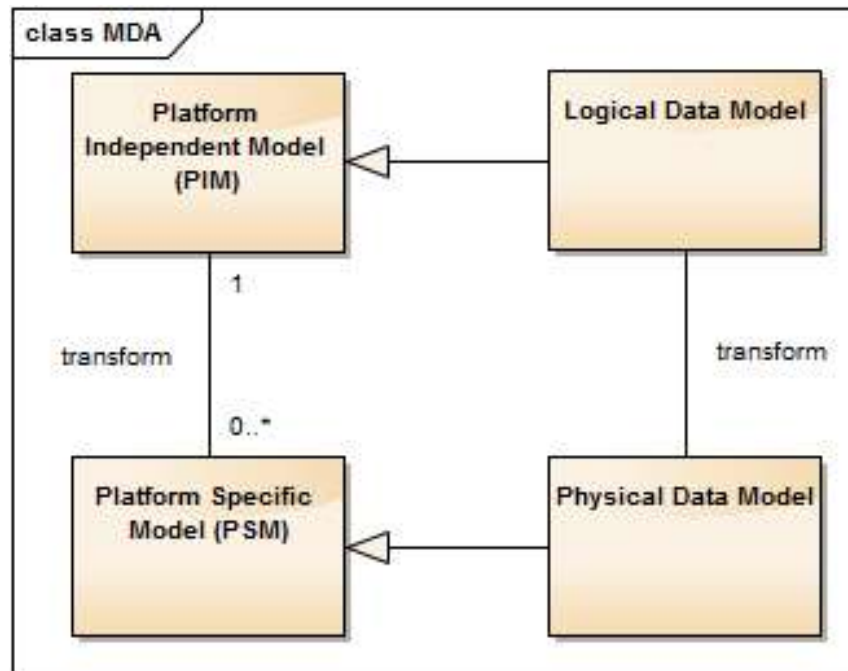


**Model Driven Architecture: from abstract data models to physical schemas**

**National standard model for road network and property data**

# Model Driven Architecture

## *Model Driven Architecture*



## *Transform*

### **Model as sketch**

- Specification is incomplete
- Transform is manual

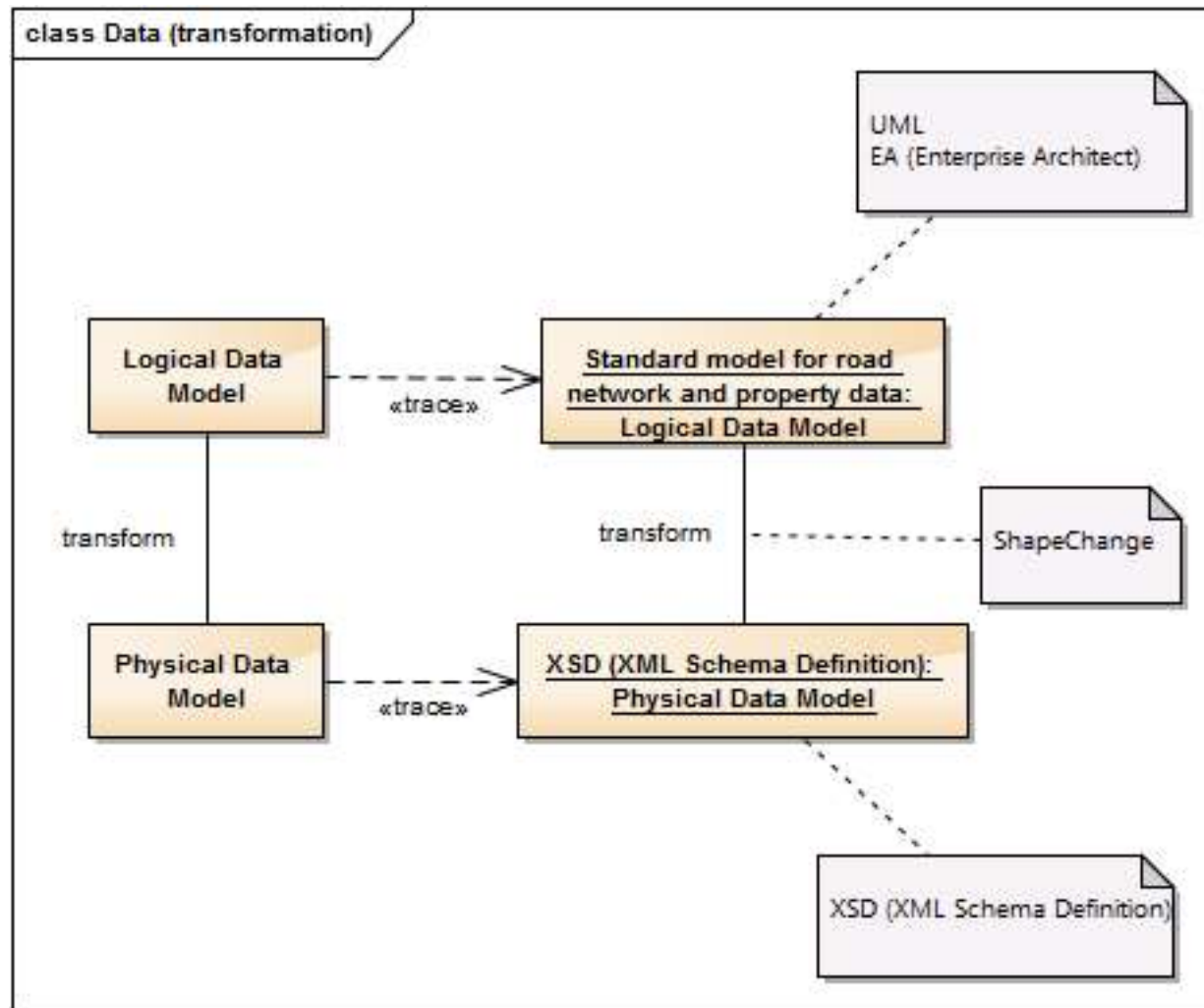
### **Model as blueprint**

- Specification is complete
- Transform is manual

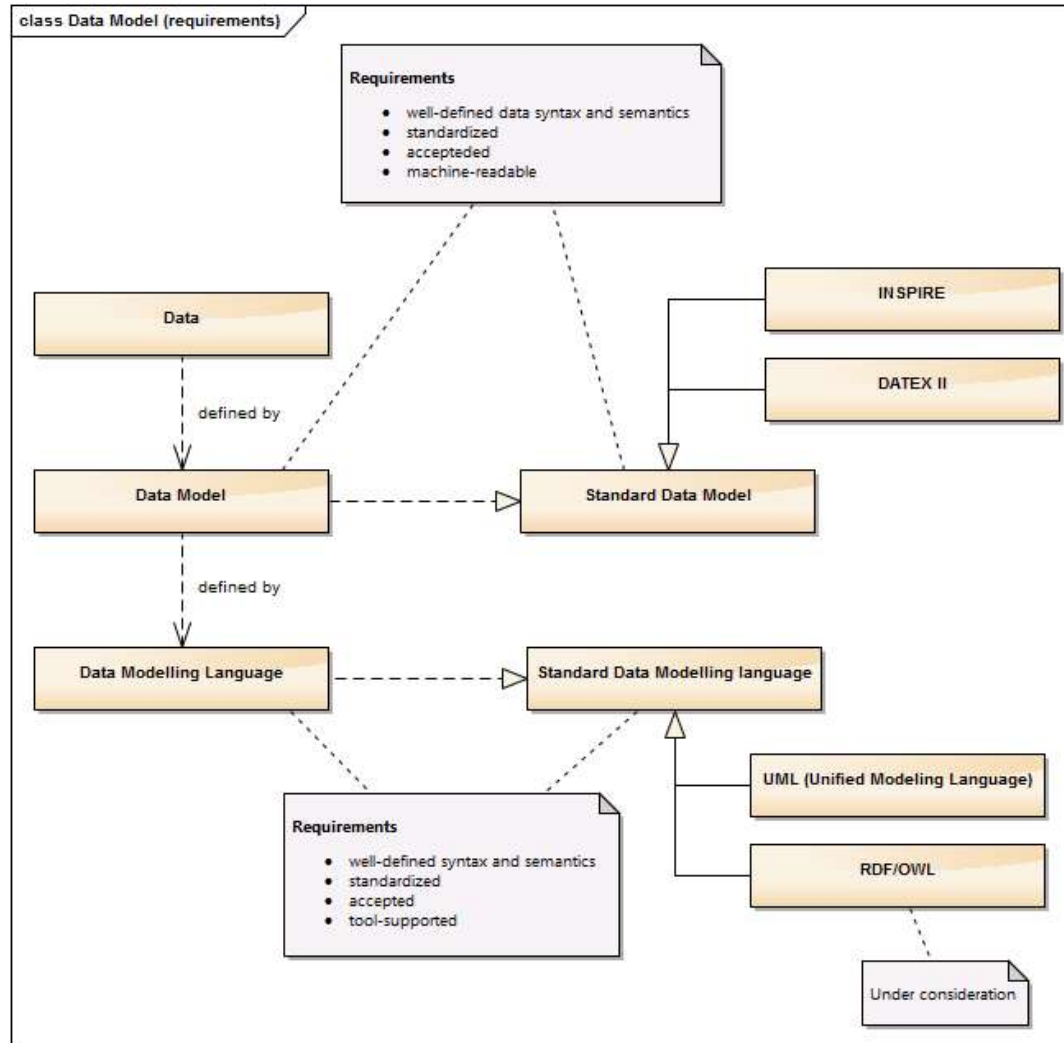
### **Model as program**

- Specification is complete
- Transform is automatic

# Model Driven Architecture

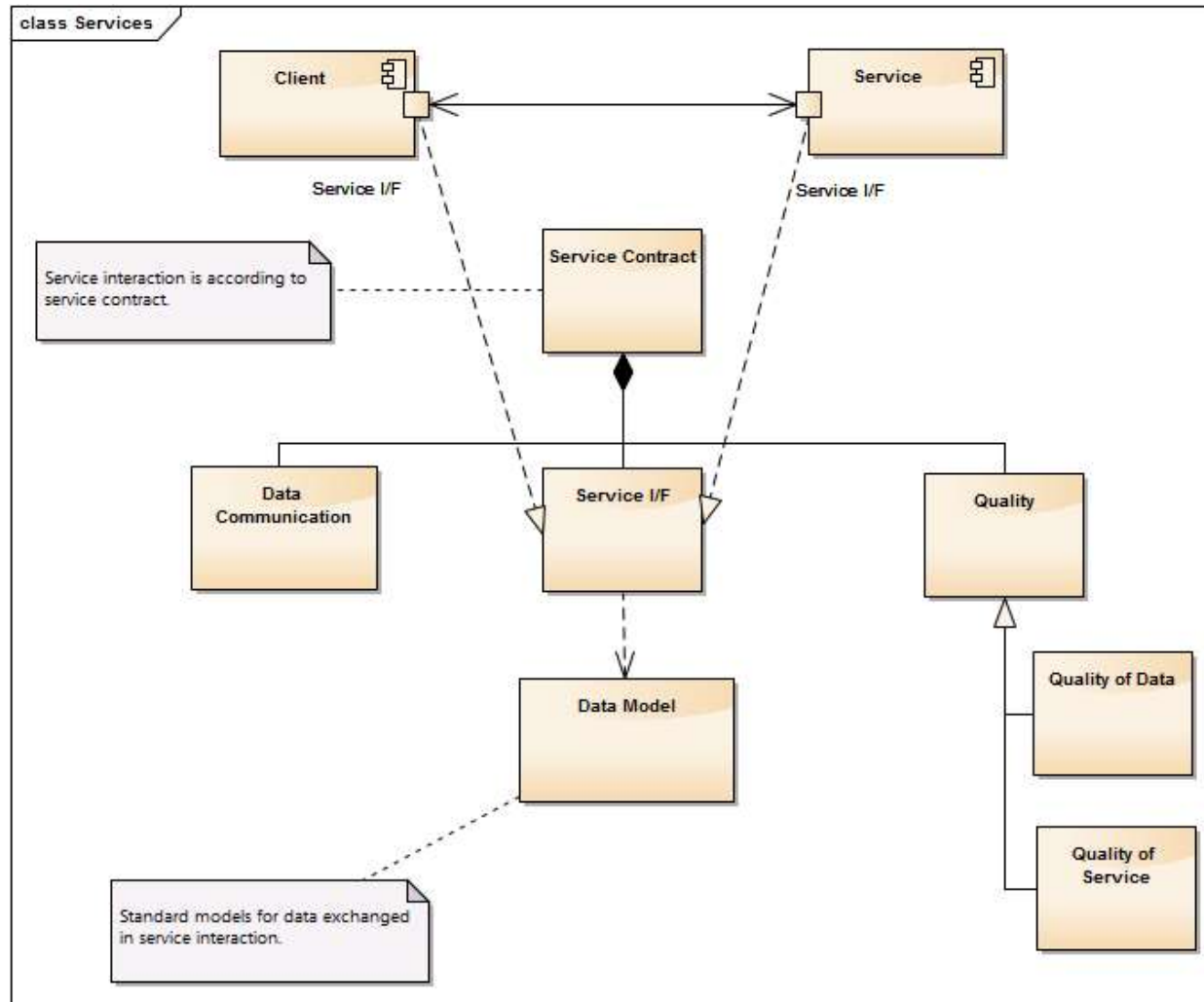


# Data Modelling



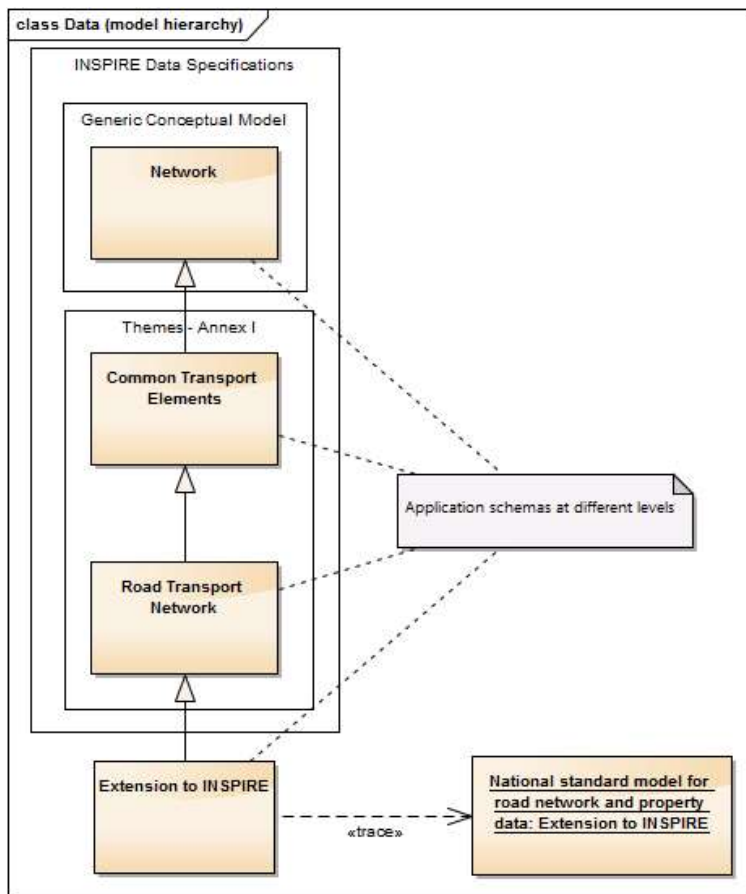


# Data Modelling



# Data Modelling

## Extending INSPIRE



## Conforming with INSPIRE

### Requirements

- do not add requirements that break requirements of the INSPIRE data specification
- do not change the INSPIRE data specification

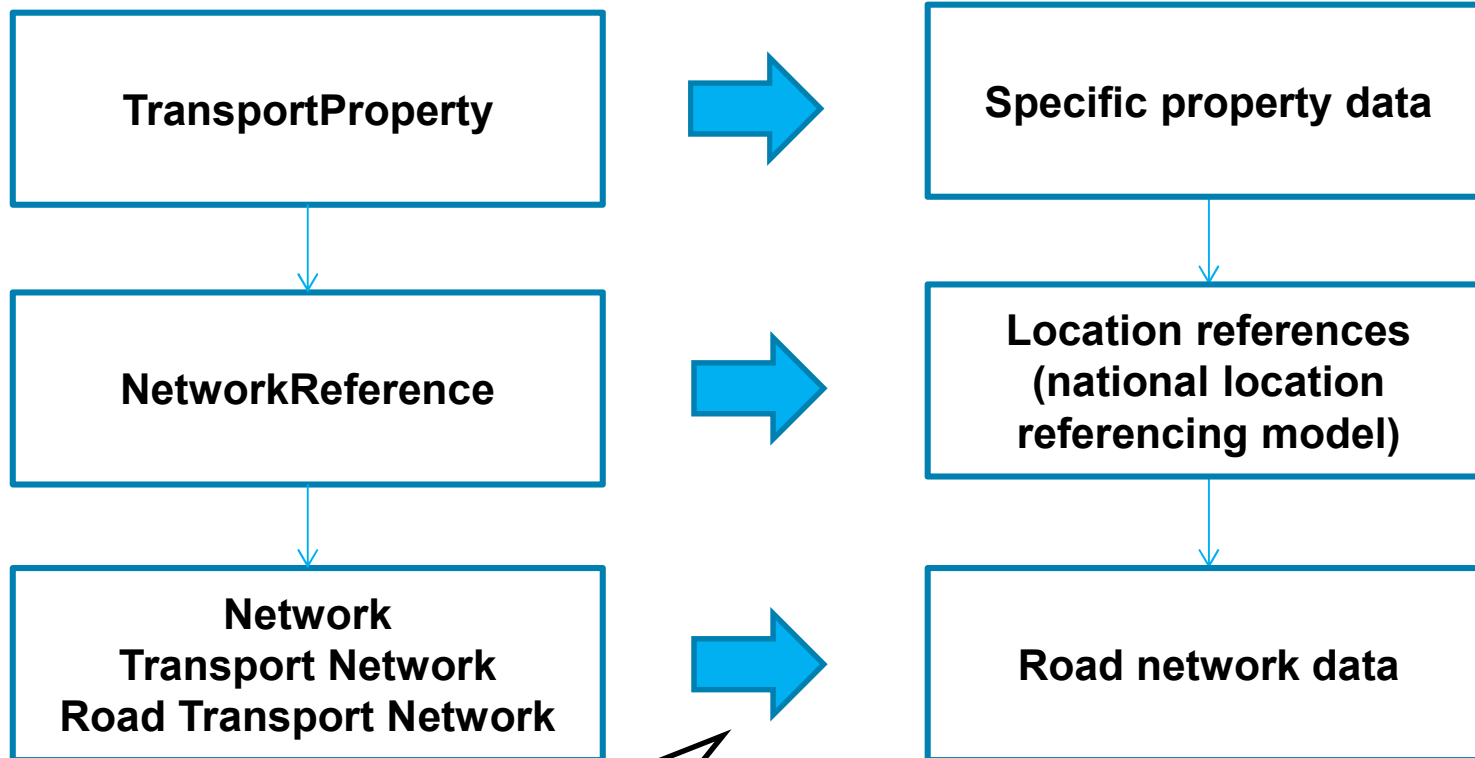
### Examples

- Import INSPIRE application schemas
- Add new types and constraints
- Extend code lists

# Data Modelling

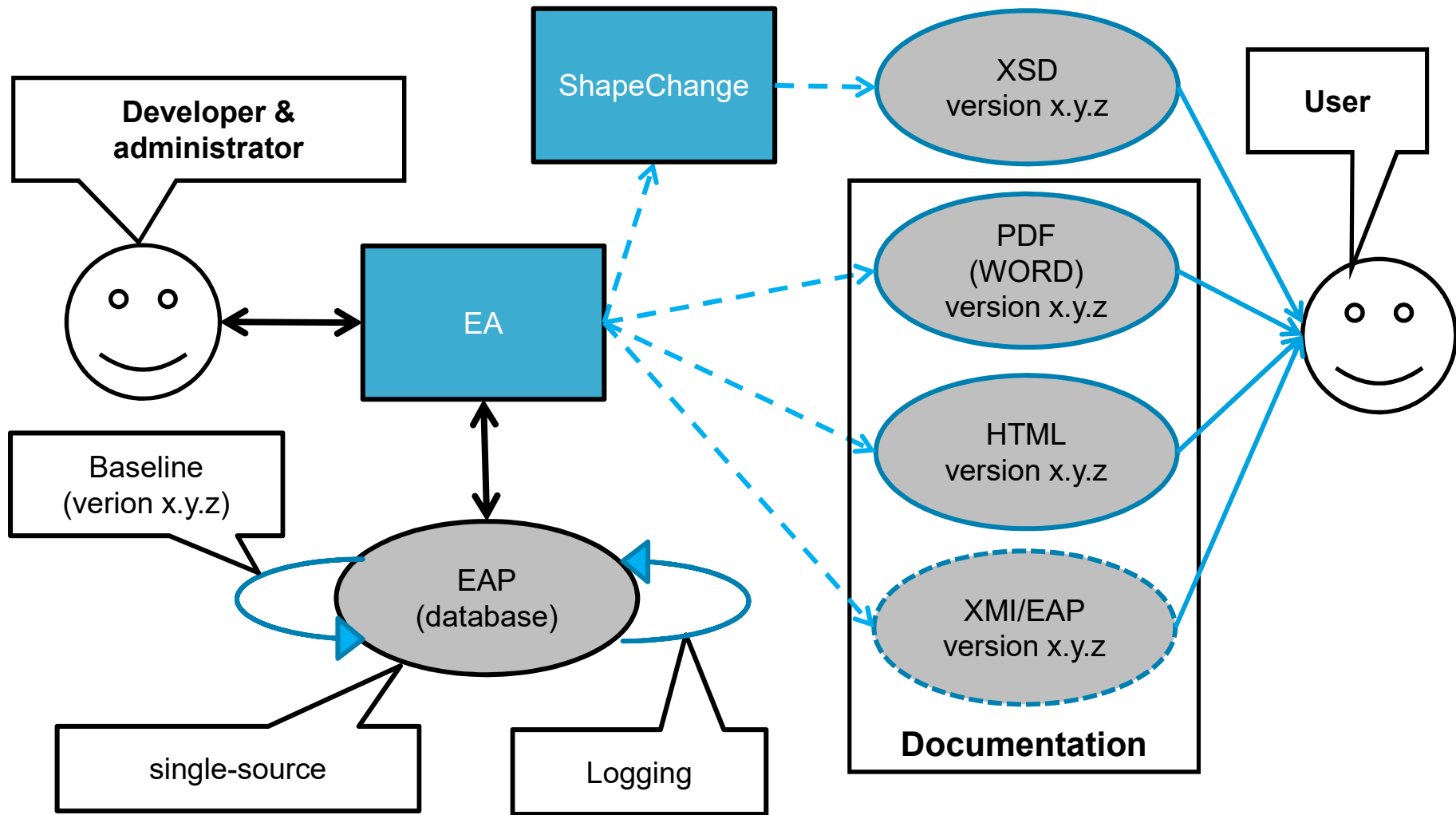
## *INSPIRE*

## *National standard model for road network and property data*



**Extending INSPIRE**

# Governance



# Concerns

## *Mitigating actions*

### ***Multiple standards***

INSPIRE (static road data)  
DATEX II (real-time road status and traffic information)  
Common concepts (network, location references)

Integration of standards development  
Common data modelling principles, patterns and practices  
Common data types

### ***Model complexity***

Modelling concepts (inheritance, abstraction)  
Tagged values  
Many levels of nesting

Simple model design  
Tool support (browsing, code generation)

### ***Readability***

Models not easy to read and understand for people outside modelling community

User guides and manuals  
Annotations  
Tool support (browsing)

Vejdirektoratet.dk