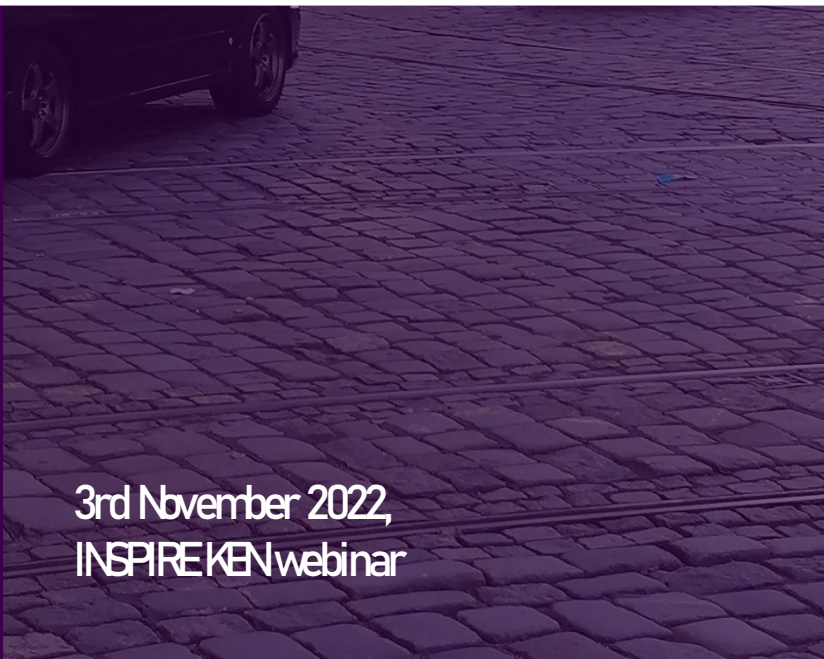
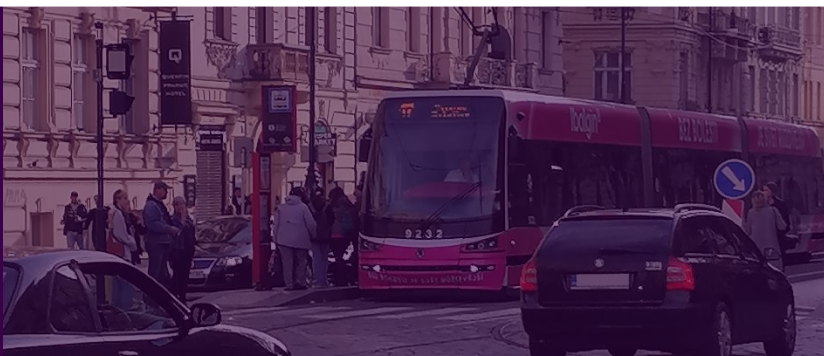
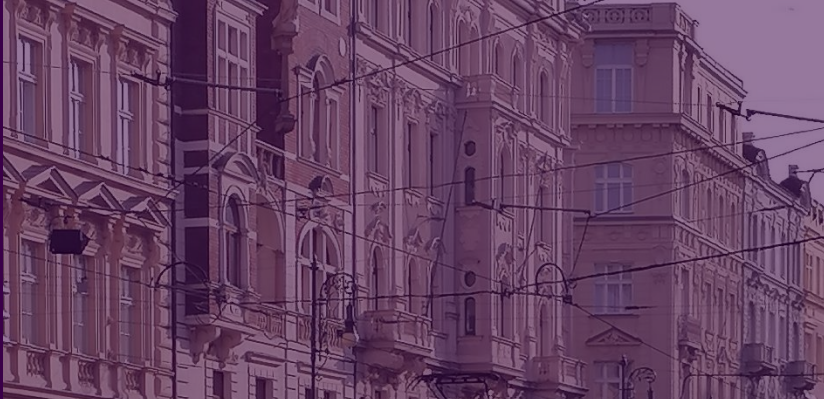




# CZECH EXPERIENCE WITH HARMONISATION OF TRANSPORT NETWORKS

3rd November 2022,  
INSPIRE KEN webinar



Veronika Kušová

Czech Office for Surveying,  
Mapping and Cadastre

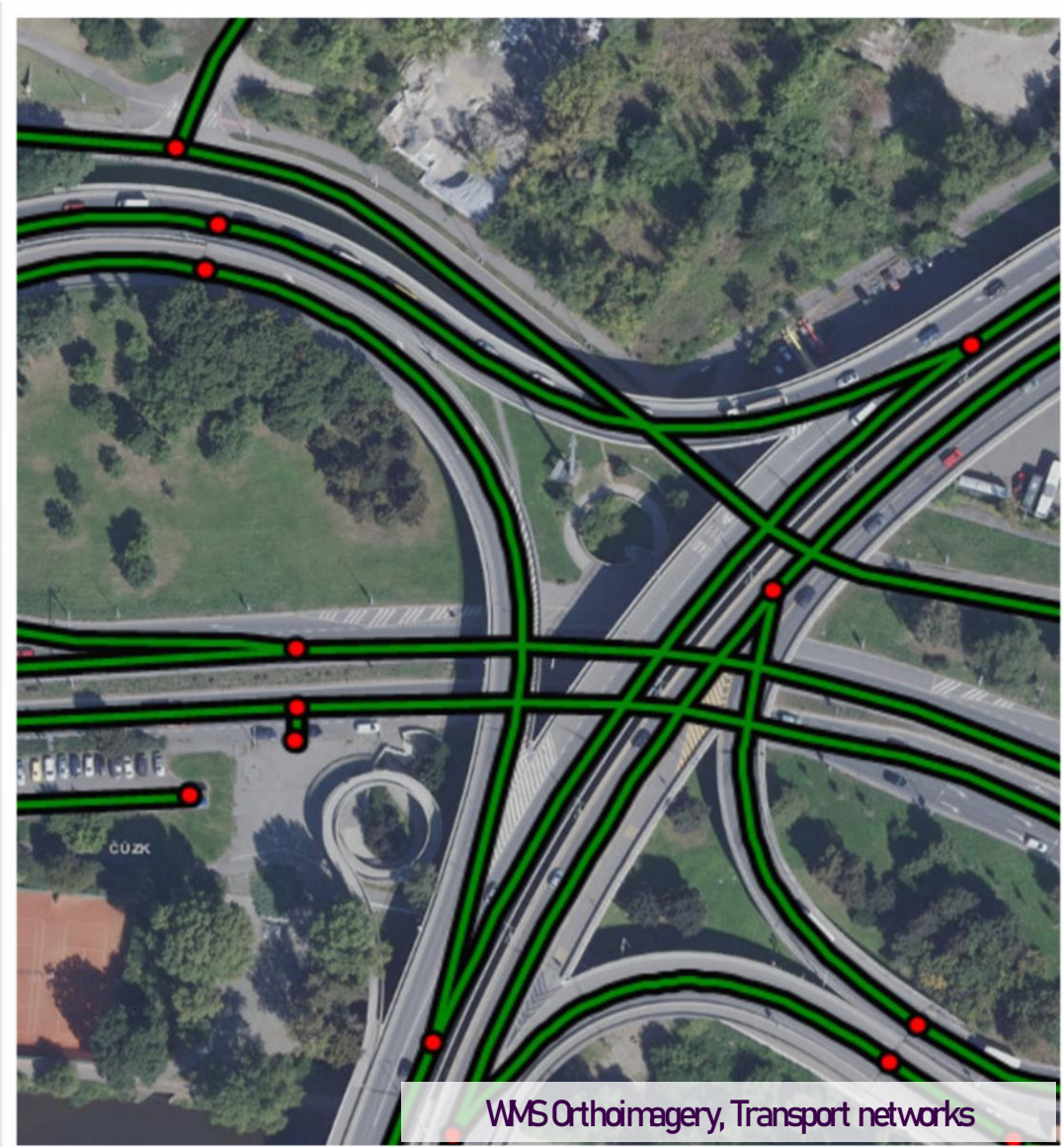
|                      | data | view<br>service | download<br>service |           |
|----------------------|------|-----------------|---------------------|-----------|
| Geographical names   |      |                 |                     | WFS       |
| Administrative units |      |                 |                     | WFS, ATOM |
| Addresses            |      |                 |                     | WFS, ATOM |
| Cadastral parcels    |      |                 |                     | WFS, ATOM |
| Transport networks   |      |                 |                     | WFS       |
| Hydrography          |      |                 |                     | WFS       |
| Elevation            |      |                 |                     | WCS       |
| Orthoimagery         |      |                 |                     | WCS       |
| Buildings            |      |                 |                     | WFS, ATOM |
| Land use             |      |                 |                     | WFS       |

# IMPORTANT MILESTONES



Harmonised WMS →

Harmonised WMS



WMS Orthoimagery, Transport networks



Testing and validation

# STATE OF PLAY

TN- Air

TN- Cable

TN- Rail

TN- Road

TN- Water

WMS1.3.0 & 1.1.1

WFS2.0 – GML3.2.1

> 5 > 1 for each dataset series



514



262



6 136



1 311



823



1 746



220



338



684

Number of hits on view services, 2021  
(in thousands)

# STATE OF PLAY

## TN-Air

AerodromeArea  
AerodromeCategory  
AerodromeNbde  
AerodromeType  
ElementLength  
ElementWidth  
FieldElevation  
RuwayArea  
SurfaceComposition  
TaxiwayArea  
TouchDownLiftOff  
AccessRestriction

UseRestriction  
VerticalPosition

## TN-Cable

CablewayLink  
VerticalPosition

## TN-Rail

NbminalTrackGauge  
NumberOfTracks  
RailwayYardArea  
RailwayElectrification  
RailwayLink  
RailwayNbde  
RailwayStationArea  
RailwayStationCode  
RailwayStationNbde  
RailwayType  
OwnerAuthority  
VerticalPosition

## TN-Road

ERoad  
FormOfWay  
FunctionalRoadClass  
NumberOfLanes  
Road  
RoadLink  
RoadLinkSequence  
RoadNbde  
RoadServiceArea  
RoadSurfaceCategory  
RoadWidth  
RoadServiceType

VerticalPosition

## TN-Water

FerryCrossing  
PortArea  
WaterwayLink

# WORKFLOW: From data source to INSPIRE infrastructure



Road and Motorway Directorate  
of the Czech Republic



Railway  
Administration



Air Navigation Services  
of the Czech Republic



State Navigation  
Authority

municipalities



The Forest  
Management  
Institute

ZABAGED

Fundamental Base of Geographic Data  
of the Czech Republic

TN- Air

TN- Cable

TN- Rail

TN- Road

TN- Water



# CHALLENGES IN HARMONISATION

| Podrobně                                                       |  | Silnice, dálnice                                               | RoadLink  | featureType             | Standard attribute | MultiValued | Value Type             | Podrobně 2              | Podrobně 1              | Anchot                  |  |
|----------------------------------------------------------------|--|----------------------------------------------------------------|-----------|-------------------------|--------------------|-------------|------------------------|-------------------------|-------------------------|-------------------------|--|
| Podrobně                                                       |  | Translomeza                                                    | ValueList | featureType             | Standard attribute | MultiValued | Value Type             | Podrobně 2              | Podrobně 1              | Anchot                  |  |
| AP001 & CISOUSRM                                               |  | AP001 & CISOUSRM                                               |           | localid                 | imposed IN         | 0..1        | CharacterString        | imposed                 | imposed                 | imposed (NR)            |  |
| const - CZ00075712-CUZE TN                                     |  | const - CZ00075712-CUZE TN                                     |           | nameSpace               |                    | 1           | CharacterString        | nameSpace               | nameSpace               | nameSpace               |  |
| unpopulated                                                    |  | unpopulated                                                    |           | versionid               |                    | 0..1 (void) | CharacterString        | versionid               | versionid               | versionid               |  |
| const - fba                                                    |  | const - fba                                                    |           | classificationScheme B1 |                    | 1           | GM_Curve               | classificationScheme B1 | classificationScheme B1 | classificationScheme B1 |  |
| unpopulated                                                    |  | unpopulated                                                    |           | Scheme B1               |                    | 1           | Boolean                | Scheme B1               | Scheme B1               | Scheme B1               |  |
| unpopulated                                                    |  | unpopulated                                                    |           | historicalVersion (NR)  |                    | 1 (void)    | DateTime               | historicalVersion (NR)  | historicalVersion (NR)  | historicalVersion (NR)  |  |
| unpopulated                                                    |  | unpopulated                                                    |           | validFrom (T1)          |                    | 1 (void)    | DateTime               | validFrom (T1)          | validFrom (T1)          | validFrom (T1)          |  |
| na jaksé to                                                    |  | na jaksé to                                                    |           | andNode                 |                    | 1 (void)    | Node                   | andNode                 | andNode                 | andNode                 |  |
| na jaksé to                                                    |  | na jaksé to                                                    |           | startNode               |                    | 1 (void)    | Node                   | startNode               | startNode               | startNode               |  |
| unpopulated                                                    |  | unpopulated                                                    |           | inNetwork IN            |                    | 1..*        | Boolean                | inNetwork               | inNetwork               | inNetwork IN            |  |
| unpopulated                                                    |  | unpopulated                                                    |           | modifiedVersion (NR)    |                    | 0..1 (void) | DateTime               | modifiedVersion (NR)    | modifiedVersion (NR)    | modifiedVersion (NR)    |  |
| unpopulated                                                    |  | unpopulated                                                    |           | geographicalName (T1)   |                    | 0..1 (void) | GeographicalName       | geographicalName        | geographicalName        | geographicalName (T1)   |  |
| Me dokumentace by byla 2x, ale v této verzi se nepodaří vložit |  | Me dokumentace by byla 2x, ale v této verzi se nepodaří vložit |           | spelling                |                    | 1..*        | SpellingONName         | spelling                | spelling                | spelling                |  |
| IMENO                                                          |  | IMENO                                                          |           | text                    |                    | 1           | CharacterString        | text                    | text                    | text                    |  |
| const - Latin                                                  |  | const - Latin                                                  |           | script                  |                    | 1 (void)    | CharacterString        | script                  | script                  | script                  |  |
| unpopulated                                                    |  | unpopulated                                                    |           | transliterationScheme   |                    | 0..1 (void) | CharacterString        | transliterationScheme   | transliterationScheme   | transliterationScheme   |  |
| unpopulated                                                    |  | unpopulated                                                    |           | pronunciation           |                    | 1 (void)    | PronunciationONName    | pronunciation           | pronunciation           | pronunciation           |  |
| unpopulated                                                    |  | unpopulated                                                    |           | pronunciationIPA        |                    | 0..1 (void) | CharacterString        | pronunciationIPA        | pronunciationIPA        | pronunciationIPA        |  |
| unpopulated                                                    |  | unpopulated                                                    |           | pronunciationSoundLink  |                    | 0..1 (void) | URI                    | pronunciationSoundLink  | pronunciationSoundLink  | pronunciationSoundLink  |  |
| const - cs                                                     |  | const - cs                                                     |           | language                |                    | 1 (void)    | CharacterString        | language                | language                | language                |  |
| const - standardised                                           |  | const - standardised                                           |           | nameStatus              |                    | 1 (void)    | NameStatusValue        | nameStatus              | nameStatus              | nameStatus              |  |
| const - endonym                                                |  | const - endonym                                                |           | mativeness              |                    | 1 (void)    | MativenessValue        | mativeness              | mativeness              | mativeness              |  |
| const - GRONAMP                                                |  | const - GRONAMP                                                |           | sourceONName            |                    | 1 (void)    | CharacterString        | sourceONName            | sourceONName            | sourceONName            |  |
| unpopulated                                                    |  | unpopulated                                                    |           | grammaticalGender       |                    | 0..1 (void) | GrammaticalGenderValue | grammaticalGender       | grammaticalGender       | grammaticalGender       |  |
| unpopulated                                                    |  | unpopulated                                                    |           | grammaticalNumber       |                    | 0..1 (void) | GrammaticalNumberValue | grammaticalNumber       | grammaticalNumber       | grammaticalNumber       |  |
| unpopulated                                                    |  | unpopulated                                                    |           | validTo (T1)            |                    | 0..1 (void) | DateTime               | validTo (T1)            | validTo (T1)            | validTo (T1)            |  |
| Objekt ZABAGED                                                 |  | Objekt ZABAGED                                                 |           | featureType             |                    | 0..1        | CharacterString        | featureType             | featureType             | featureType             |  |
| Silnice nevidova                                               |  | Silnice nevidova                                               |           | featureType             |                    | 0..1        | CharacterString        | featureType             | featureType             | featureType             |  |
| Podrobně                                                       |  | Podrobně                                                       |           | featureType             |                    | 0..1        | CharacterString        | featureType             | featureType             | featureType             |  |
| AP011 & e                                                      |  | AP011 & e                                                      |           | localid                 | imposed IN         | 0..1        | CharacterString        | imposed                 | imposed                 | imposed (NR)            |  |
| const - CZ00075712-CUZE TN                                     |  | const - CZ00075712-CUZE TN                                     |           | nameSpace               |                    | 1           | CharacterString        | nameSpace               | nameSpace               | nameSpace               |  |
| unpopulated                                                    |  | unpopulated                                                    |           | versionid               |                    | 0..1 (void) | CharacterString        | versionid               | versionid               | versionid               |  |
| const - fba                                                    |  | const - fba                                                    |           | classificationScheme B1 |                    | 1           | GM_Curve               | classificationScheme B1 | classificationScheme B1 | classificationScheme B1 |  |
| unpopulated                                                    |  | unpopulated                                                    |           | Scheme B1               |                    | 1           | Boolean                | Scheme B1               | Scheme B1               | Scheme B1               |  |
| unpopulated                                                    |  | unpopulated                                                    |           | historicalVersion (NR)  |                    | 1 (void)    | DateTime               | historicalVersion (NR)  | historicalVersion (NR)  | historicalVersion (NR)  |  |
| unpopulated                                                    |  | unpopulated                                                    |           | validFrom (T1)          |                    | 1 (void)    | DateTime               | validFrom (T1)          | validFrom (T1)          | validFrom (T1)          |  |
| na jaksé to                                                    |  | na jaksé to                                                    |           | andNode                 |                    | 1 (void)    | Node                   | andNode                 | andNode                 | andNode                 |  |
| na jaksé to                                                    |  | na jaksé to                                                    |           | startNode               |                    | 1 (void)    | Node                   | startNode               | startNode               | startNode               |  |
| unpopulated                                                    |  | unpopulated                                                    |           | inNetwork IN            |                    | 1..*        | Boolean                | inNetwork               | inNetwork               | inNetwork IN            |  |
| unpopulated                                                    |  | unpopulated                                                    |           | modifiedVersion (NR)    |                    | 0..1 (void) | DateTime               | modifiedVersion (NR)    | modifiedVersion (NR)    | modifiedVersion (NR)    |  |
| unpopulated                                                    |  | unpopulated                                                    |           | geographicalName (T1)   |                    | 0..1 (void) | GeographicalName       | geographicalName        | geographicalName        | geographicalName (T1)   |  |
| Me dokumentace by byla 2x, ale v této verzi se nepodaří vložit |  | Me dokumentace by byla 2x, ale v této verzi se nepodaří vložit |           | spelling                |                    | 1..*        | SpellingONName         | spelling                | spelling                | spelling                |  |
| IMENO                                                          |  | IMENO                                                          |           | text                    |                    | 1           | CharacterString        | text                    | text                    | text                    |  |
| const - Latin                                                  |  | const - Latin                                                  |           | script                  |                    | 1 (void)    | CharacterString        | script                  | script                  | script                  |  |
| unpopulated                                                    |  | unpopulated                                                    |           | transliterationScheme   |                    | 0..1 (void) | CharacterString        | transliterationScheme   | transliterationScheme   | transliterationScheme   |  |
| unpopulated                                                    |  | unpopulated                                                    |           | pronunciation           |                    | 1 (void)    | PronunciationONName    | pronunciation           | pronunciation           | pronunciation           |  |
| unpopulated                                                    |  | unpopulated                                                    |           | pronunciationIPA        |                    | 0..1 (void) | CharacterString        | pronunciationIPA        | pronunciationIPA        | pronunciationIPA        |  |
| unpopulated                                                    |  | unpopulated                                                    |           | pronunciationSoundLink  |                    | 0..1 (void) | URI                    | pronunciationSoundLink  | pronunciationSoundLink  | pronunciationSoundLink  |  |
| const - cs                                                     |  | const - cs                                                     |           | language                |                    | 1 (void)    | CharacterString        | language                | language                | language                |  |
| const - standardised                                           |  | const - standardised                                           |           | nameStatus              |                    | 1 (void)    | NameStatusValue        | nameStatus              | nameStatus              | nameStatus              |  |
| const - endonym                                                |  | const - endonym                                                |           | mativeness              |                    | 1 (void)    | MativenessValue        | mativeness              | mativeness              | mativeness              |  |
| const - GRONAMP                                                |  | const - GRONAMP                                                |           | sourceONName            |                    | 1 (void)    | CharacterString        | sourceONName            | sourceONName            | sourceONName            |  |
| unpopulated                                                    |  | unpopulated                                                    |           | grammaticalGender       |                    | 0..1 (void) | GrammaticalGenderValue | grammaticalGender       | grammaticalGender       | grammaticalGender       |  |
| unpopulated                                                    |  | unpopulated                                                    |           | grammaticalNumber       |                    | 0..1 (void) | GrammaticalNumberValue | grammaticalNumber       | grammaticalNumber       | grammaticalNumber       |  |
| unpopulated                                                    |  | unpopulated                                                    |           | validTo (T1)            |                    | 0..1 (void) | DateTime               | validTo (T1)            | validTo (T1)            | validTo (T1)            |  |

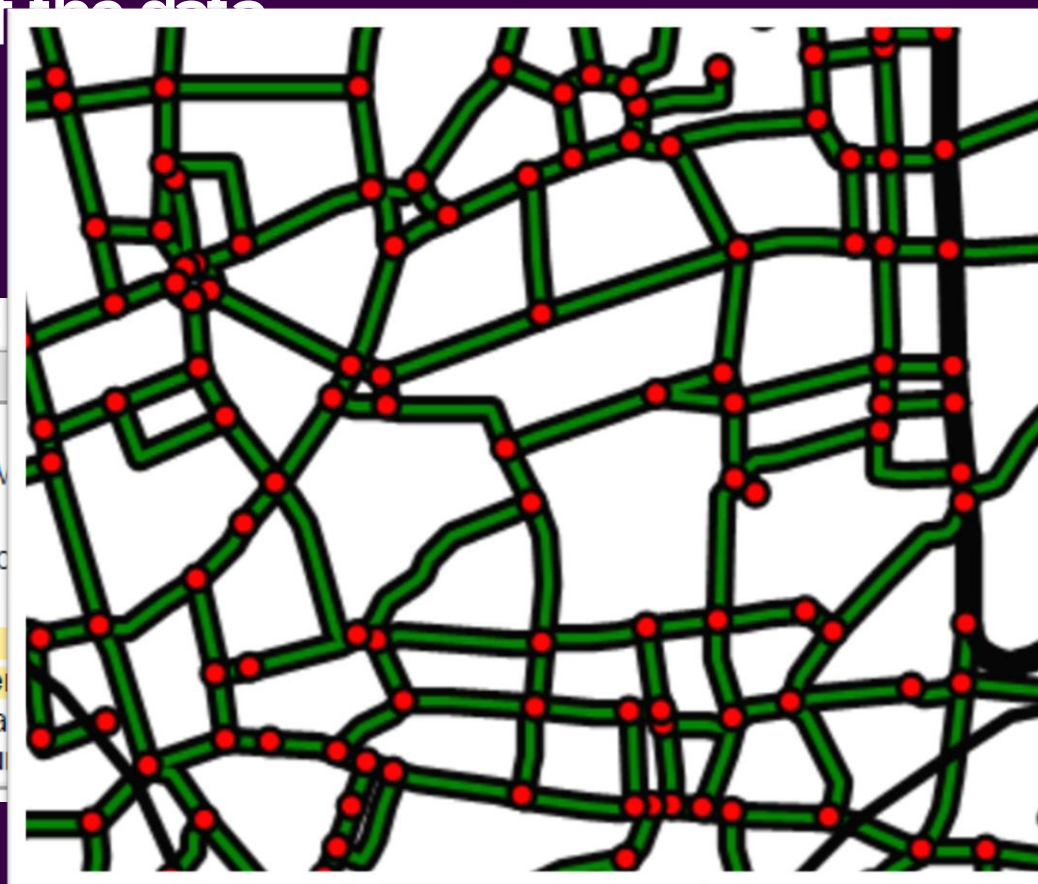
# CHALLENGES IN HARMONISATION

## Derivation of nodes and new segmenting of the data

### 5.3.2.4.17. Node

#### Node (abstract)

|              |                                                                                                                                                                                                                                                                                                                            |
|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Package:     | Network                                                                                                                                                                                                                                                                                                                    |
| Reference:   | INSPIRE Data Specifications – Base Models – Generic Network Model 1.0 [DS-D2.10.1]                                                                                                                                                                                                                                         |
| Definition:  | Represents a significant position in the network that always occurs at the beginning or the end of a link.                                                                                                                                                                                                                 |
| Description: | NOTE if a topological representation of the network is used the node is either a topological connection between two or more links or the termination of a link. If a geometric representation of the network is used roads are represented by points or alternatively another geometric shape. [European Commission, 2007] |



# CHALLENGES IN HARMONISATION

Unique identifiers for links

Connection of nodes and links

## Geometry

Failed: 1 / 2

Verify that geometries are consistent with the geometries of other features in the data set.

Status Failed

Duration 0.057 s

+ tn-as.c.1: No free transport nodes

👁️ tn-as.c.2: Intersections only at crossings

### IR Requirement

Annex II, Section 7.9.3

#### Theme-specific Requirements – Geometry representation

2. In a Transport Networks data set which contains nodes, these nodes shall only be present where Transport Links connect or end.

VALID  
DATA

RICH  
DATA



# CHALLENGES IN HARMONISATION

|                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                     |
|-------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  INSPIRE téma Dopravní síť - letecká doprava (TN_AIR)     |         |
|  INSPIRE téma Dopravní síť - lanová dráha (TN_CABLE)      |         |
|  INSPIRE téma Dopravní síť - vodní doprava (TN_WATER)     |         |
|  INSPIRE téma Dopravní síť - železniční doprava (TN_RAIL) |         |
|  INSPIRE téma Dopravní síť - silniční doprava (TN_ROAD)   |     |

Data and service linking on the INSPIRE Geoportal

# WHAT IS NEXT?

To test & get better

Open data

Geopackage & Atom services



???



**Thank you for your attention!**

Veronika Kůsová

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Czech Office for Surveying, Mapping and Cadastre