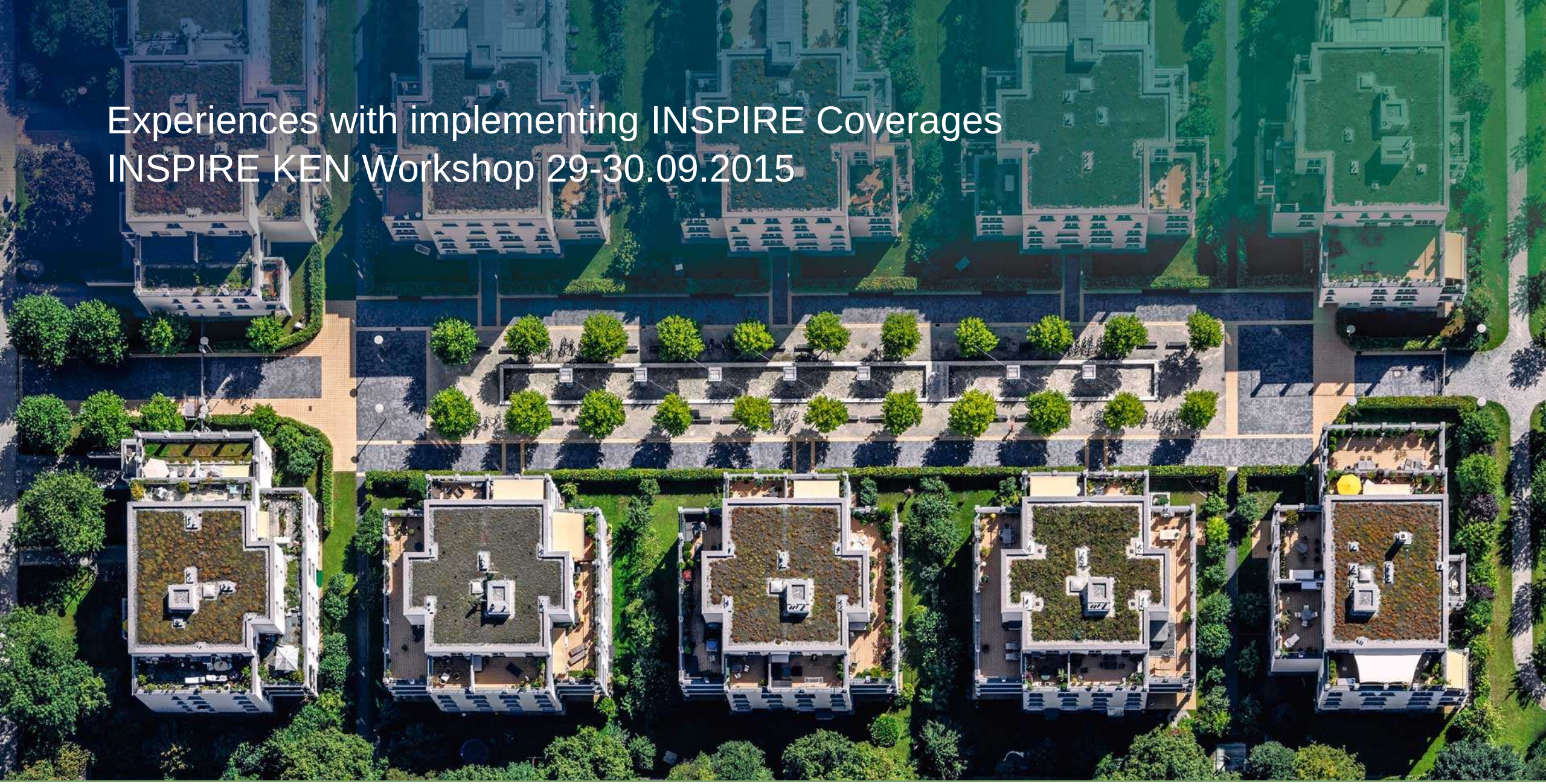
Experiences with implementing INSPIRE Coverages
INSPIRE KEN Workshop 29-30.09.2015



Projects

- Saxon State Spatial Data and Land Survey Corporation (GeoSN)
  > sax4INSPIRE: Elevation and Orthoimagery
- German Federal Environment Agency (UBA)
  > Landcover

Project Goal:

- First Approach to deal with the data model
- Use existing infrastructure to create services
- Describe Conceptual Mapping
- File based Coverage Datasets
- ATOM Feeds + (WMS)

Application Schema 'ElevationGridCoverage' (version 3.0)

Type	Documentation	Attribute Association role	Attribute / Association role / Constraint	Values / Enumerations	Multiplicity	Voidable / Non-Voidable		Type
ElevationGridCoverageAggregation	-- Name -- elevation grid coverage aggregation Geometrical							
		contributingFootpri	-- Name -- contributing	GM_MultiSurface	1			
ElevationGridCoverage Supertypes RectifiedGridCoverage CoverageByDomainAndRangeCoverage	-- Name -- elevation grid coverage Continuous coverage which uses a systematic tessellation based on a regular rectified quadrilateral grid to cover its domain, where the elevation property value is usually known for each of the grid points forming this domain.SOURCE Adapted from [ISO 19123:2005].							
		metadata	-- Name -- metadata	Any	0..*		null	
		rangeType	-- Name -- range type	RecordType	1		konstant()	
		coverageFunction	-- Name -- coverage	CoverageFunction	0..1		coverageFunction.sequenceRule.axisOrder	
		domainSet	-- Name -- domain set	Any	1		Ausdehnung plus offset +	
		rangeSet	-- Name -- range set	Any	0..*		copy(ASCII Data col 5)	grid File einbinden für Ascii
		beginLifespanVersi	-- Name -- begin lifespan	DateTime	1	voidable	setVoid(unpopulated)	
		domainExtent	-- Name -- domain	EX_Extent	1..*		abgeleitet aus geometrie	
		endLifespanVersion	-- Name -- end lifespan	DateTime	1	voidable	setVoid(unpopulated)	
		inspireId	-- Name -- inspire ID	Identifier	1		namespace: DE.SN.EL	
		propertyType	-- Name -- property	ElevationPropertyTypeVal	1		setValue(height)	
		surfaceType	-- Name -- surface	SurfaceTypeValue*	1		setValue(dbmlsn)	
		contributingElevatio	-- Name -- contributing	ElevationGridCoverage	0..*		Ein Aggregat für ganz Sachsen mit	

Elevation

- Source Datasets:
  - > XYZ Grid files
  - > ASCII encoded
  - > Resolution 2m
  - > DTM + DSM
  - > Each ~70GB

Application Schema 'LandCoverRaster' (version 3.0)								
Type	Documentation	Attribute Association role Constraint	Attribute / Association role / Constraint	Values / Enumerations	Multiplicity	Voidable / Non-Voidable		Type
LandCoverGridCoverage Supertypes:RectifiedGridCoverageCoverageByDomainAndRangeCoverage	-- Name -- Land Cover Grid Coverage A raster representation for Land Cover data.This representation allows Land Cover data being supported by rectified grid coverage (ISO 19123).							
		metadata	-- Name -- metadata Application specific	Any	0..*			
		rangeType	-- Name -- range type Description of the	RecordType	1			
		coverageFunction	-- Name -- coverage function Description	CoverageFunction	0..1			
		domainSet	-- Name -- domain set Configuration of the	Any	1			
		rangeSet	-- Name -- range set Set of feature attribute	Any	0..*			
		inspireId	-- Name -- inspireId External object identifier	Identifier	1			
		beginLifespanVersi	-- Name -- beginLifespanVersion	DateTime	1	voidable		
		endLifespanVersion	-- Name -- endLifespanVersion	DateTime	0..1	voidable		
		extent	-- Name -- extent Contains the extent of the	EX_Extent	1			
		name	-- Name -- name Name of the Land Cover	CharacterString	1			
		nomenclatureDocu	-- Name -- nomenclatureDocumentati	LandCoverNomenclature	1			
		validFrom	-- Name -- validFrom The time when the	Date	1	voidable		
		validTo	-- Name -- validTo The time from which the	Date	1	voidable		

Orthoimagery

Source Datasets:

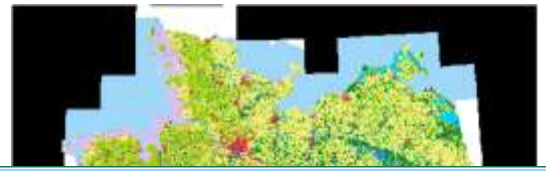
- > GeoTIF
- > ~200GB / 5000 Tiles
- > 20cm resolution

Application Schema 'Orthoimagery' (version 3.0)

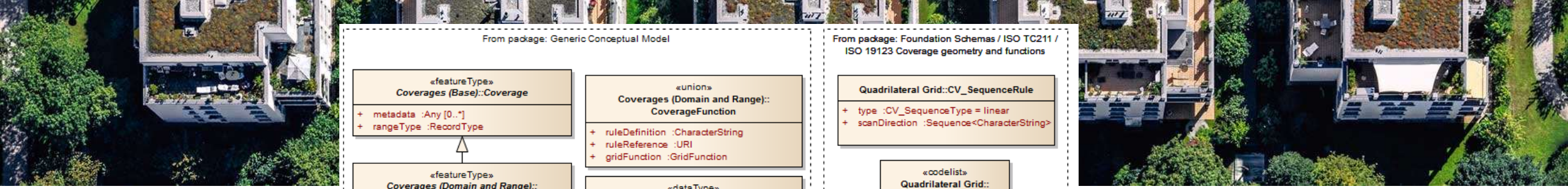
Type	Documentation	Attribute Association role Constraint	Attribute / Association role / Constraint	Values / Enumerations	Multiplicity	Voidable / Non-Voidable		Type	Documentation
OrthoimageCoverage Supertypes: RectifiedGridCoverage CoverageByDomainAndRangeCoverage	-- Name -- orthoimage coverage Raster image of the Earth surface that has been geometrically corrected ("orthorectified") to remove distortion caused by differences in elevation, sensor tilt and, optionally, by sensor optics.NOTE 1 An orthoimage coverage is a continuous coverage based on a rectified quadrilateral grid. It is provided with an interpolation method to evaluate value records at any direct position within its domain. NOTE 2 An orthoimage coverage can be derived from one single input image or from different input images which have been mosaicked and merged								
		metadata	-- Name -- metadata Application specific	Any	0..*		null		
		rangeType	-- Name -- range type Description of the	RecordType	1		Angaben über		
		coverageFunction	-- Name -- coverage function Description	CoverageFunction	0..1		null		
		domainSet	-- Name -- domain set Configuration of the	Any	1		Enthält information		
		rangeSet	-- Name -- range set Set of feature attribute	Any	0..*		gml:File -> geotiff datei		
		inspireId	-- Name -- inspire identifier External	Identifier	1		namespace= DE.SN.OI		
		domainExtent	-- Name -- domain extent Extent of the	EX_Extent	1..*		BBoX Kachel		
		footprint	-- Name -- footprint Geographic area	GM_MultiSurface	1	voidable	setVoid(unpopulated)		
		interpolationType	-- Name -- interpolation type Mathematical	InterpolationMethodValue	1		setCodelistValue('http:/		
		name	-- Name -- name Free text name of the	CharacterString	0..1	voidable	copy(Kachelname)		
		phenomenonTime	-- Name -- phenomenon time Description of	TM_Period	0..1	voidable	Bildfluglos: begin:		
		beginLifespanVersi	-- Name -- begin lifespan version Temporal	TM_Position	1	voidable	setVoid(unpopulated)		
		endLifespanVersion	-- Name -- end lifespan version Temporal	TM_Position	0..1	voidable	setVoid(unpopulated)		
		contributingOrthoim	Reference to the orthoimage coverages	OrthoimageCoverage	0..*		nicht bei Kacheln		
		mosaicElement	Spatial representation of the acquisition time of a	MosaicElement	0..*	voidable	setVoid(unpopulated)		
OrthoimageAggreg	-- Name -- orthoimage								

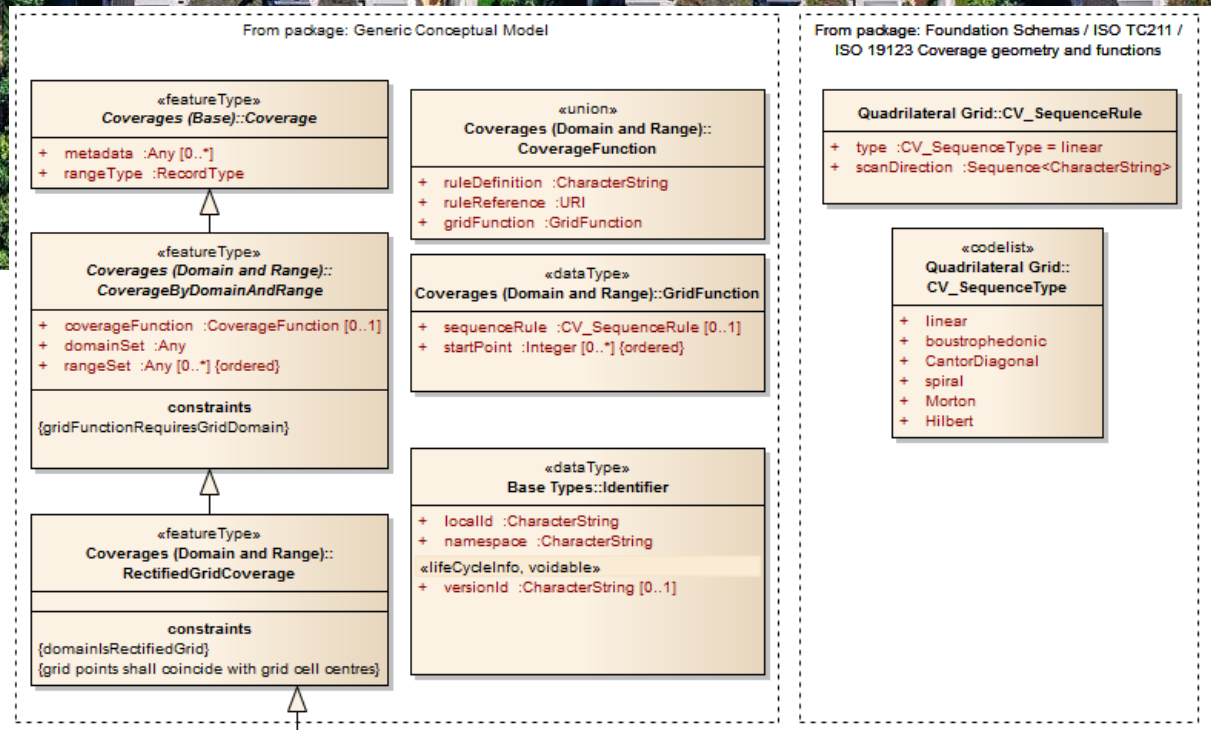
LandCover

- Source Datasets:
  - > ESRI Grid
  - > CLC 1990,2000, 2006



Application Schema 'LandCoverRaster' (version 3.0)							
Type	**Documentation**	**Attribute Association role Constraint**	**Attribute / Association role / Constraint**	**Values / Enumerations**	**Multiplicity**	**Voidable / Non-Voidable**	**Type**
LandCoverGridCoverage Supertypes:RectifiedGridCoverageCoverageByDomainAndRangeCoverage	-- Name -- Land Cover Grid Coverage A raster representation for Land Cover data.This representation allows Land Cover data being supported by rectified grid coverage (ISO 19123).						
		metadata	-- Name -- metadata Application specific	Any	0..*		
		rangeType	-- Name -- range type Description of the	RecordType	1		
		coverageFunction	-- Name -- coverage function Description	CoverageFunction	0..1		
		domainSet	-- Name -- domain set Configuration of the	Any	1		
		rangeSet	-- Name -- range set Set of feature attribute	Any	0..*		
		inspireId	-- Name -- inspireId External object identifier	Identifier	1		
		beginLifespanVersi	-- Name -- beginLifespanVersion	DateTime	1	voidable	
		endLifespanVersion	-- Name -- endLifespanVersion	DateTime	0..1	voidable	
		extent	-- Name -- extent Contains the extent of the	EX_Extent	1		
		name	-- Name -- name Name of the Land Cover	CharacterString	1		
		nomenclatureDocu	-- Name -- nomenclatureDocumentati	LandCoverNomenclature	1		
		validFrom	-- Name -- validFrom The time when the	Date	1	voidable	
		validTo	-- Name -- validTo The time from which the	Date	1	voidable	



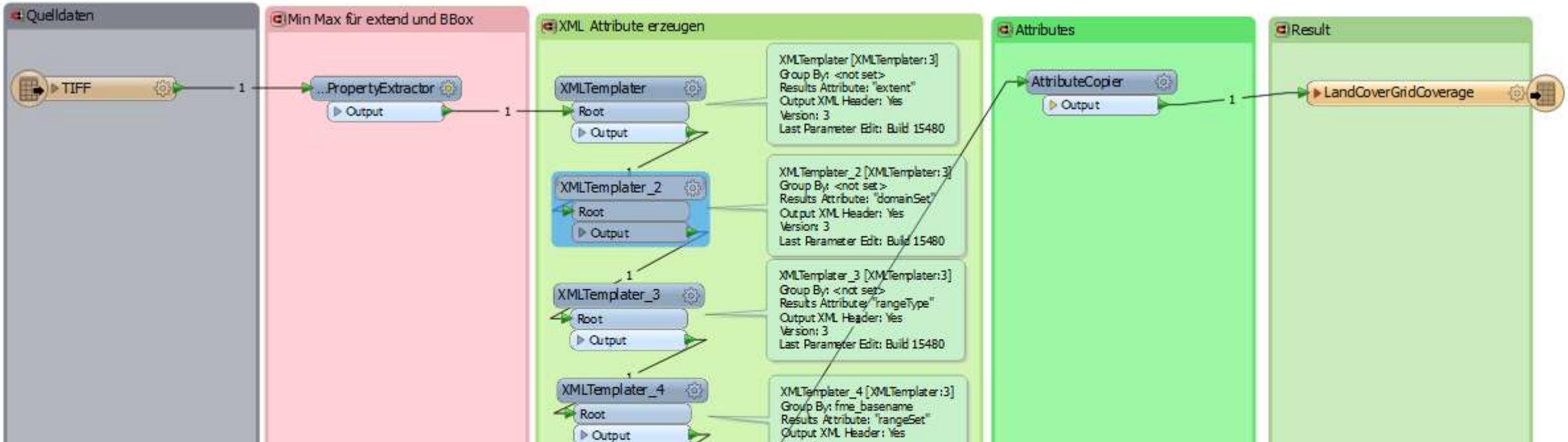


Implementation with FME

- Data Pre-Processing
  - > Convert ESRI Grid to TIFF
  - > Use in gml:File part of the RangeSet
- Transformation
  - > rangeSet as external Reference for Orthoimagery
  - > rangeSet inline for Elevation

Implementation in FME

- FME GML Writer
  - > Coverage Attributes domainSet, rangeSet, rangeType with XML Templaters

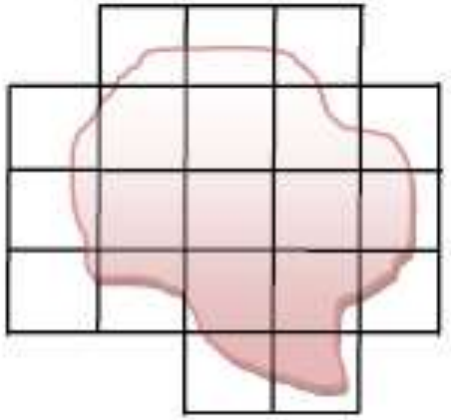


ATOM Feed Services

- https://geodienstetest.sachsen.de/iatom_geosn_orthofotos/guest/Service_ab4e5e46-9cbb-4836-b822-9a67d40eb5fd.atom.xml
- https://geodienstetest.sachsen.de/iatom_geosn_orthofotos/guest/Dataset_52749cf1-027a-400e-8424-1cd3feef1108.atom.xml
- https://geodienstetest.sachsen.de/iatom_geosn_orthofotos/guest/GML/OrthoimageCoverage_dop20rgbi_33400_5656.gml
- https://geodienstetest.sachsen.de/iatom_geosn_orthofotos/guest/GML/dop20rgbi_33400_5654.tif

Challenges

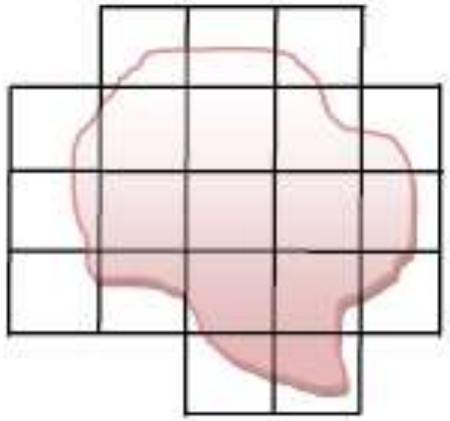
- Size of the dataset
  - > Tiling is not supported in the encoding (?)
  - > Data is delivered via ATOM Feeds
- Supporting multiple CRS



a) Simple grid with edge-matching tiles

Possible solution to tiling issue

- Use multiple rangeSets



a) Simple grid with edge-matching tiles


```
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        <gml:rangeParameters/>
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        <gml:fileStructure>TIFF 6.0</gml:fileStructure>
    </gml:File>
    <gml:File>
        <gml:rangeParameters/>
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    </gml:File>
    <gml:File>
        <gml:rangeParameters/>
        <gml:fileReference>dop20rgbi_33278_5596.tif</gml:fileReference>
        <gml:fileStructure>TIFF 6.0</gml:fileStructure>
    </gml:File>
</gml:rangeSet>
```

Thank you! Questions?

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