



# Transformation of buildings from BDOT10k to ELF

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# PRESENTATION CONTAINS:



- ✓ Short presentation of source data - BDOT10k
- ✓ Transformation issues (mapping table, tools)
- ✓ Conclusions



- ✓ **Short presentation of source data - BDOT10k**
- ✓ Transformation issues (mapping table, tools)
- ✓ Conclusions



# INFRASTRUCTURE FOR SPATIAL INFORMATION



Coordinate reference systems

Geographical grid systems

Geographical names

Administrative units

Addresses

Cadastral parcels

BDOT10k

Transport networks

Elevation

Land cover

BDOT10k

Orthoimagery

Buildings

BDOT10k

Soil

Utility and governmental services

BDOT10k

Production and industrial facilities

BDOT10k

Area management/restriction/regulation  
zones and reporting units

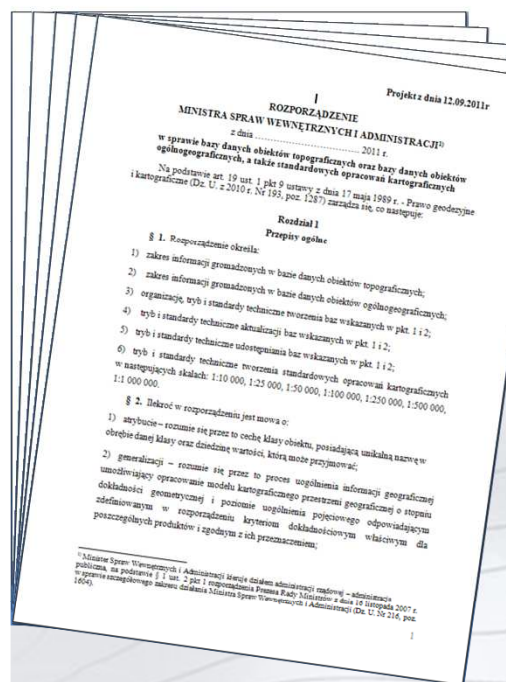
# REGULATION OF THE MINISTER OF INTERIOR AND ADMINISTRATION



dated November 27, 2011

regarding the database of topographic objects,  
and the database of general geographic objects,  
as well as the standardized cartographic documents

**BDOT10k**  
**BDOO**



		Number of pages
Main part	Defines : 1) The scope of information collected in databases: - of topographic objects; - of general geographic objects. 2) Organization, procedures and technical standards for creating, updating and sharing of the databases;; 3) Organization, procedures and technical standards for creating, updating and sharing the standardized cartographic documents.	7
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		5 <b>1055</b>



# SCOPE OF DATABASE OF TOPOGRAPHIC OBJECTS



## Classification of objects in three levels of detail

### 1 level

Category object classes - 9

### 2 level

Objects class – 58

(74 – the division containing type of data geometry)

### 3 level

Objects - 428

### Lists – 10

OT\_Roadway  
OT\_Power Station  
OT\_Road  
OT\_Railway  
OT\_Line of Railway  
OT\_Watercourse  
OT\_Water Reservoir  
OT\_Port  
OT\_Airport  
OT\_Mine

#### AD - JEDNOSTKI PODZIAŁU TERYTORIALNEGO

OT\_ADJA - jednostka podziału administracyjnego  
OT\_ADMS - miejscowość

#### TC - TERENY CHRONIONE

OT\_TCON - obszar Natura 2000  
OT\_TCPK - park krajobrazowy  
OT\_TCPN - park narodowy  
OT\_TCRZ - rezerwat

#### OI - OBIEKT INNY

OT\_OIPR - obiekt przyrodniczy  
OT\_OIKM - obiekt związany z komunikacją  
OT\_OIOR - obiekt o znaczeniu orientacyjnym w terenie  
OT\_OIMK - mokradło  
OT\_OISZ - szuwary

#### SU - SIĘĆ UZBROJENIA TERENU

OT\_SULN - linia napowietrzna  
OT\_SUPR - przewód rurowy

#### SK - SIĘĆ KOMUNIKACYJNA

OT\_SKJZ - jezdnia  
OT\_SKDR - droga  
OT\_SKRW - rondo i węzeł drogowy  
OT\_SKRP - ciąg ruchu pieszego i rowerowego  
OT\_SKTR - tor lub zespół torów  
OT\_SKPP - przeprawa

#### SW - SIĘĆ WODNA

OT\_SWRS - rzeka i strumień  
OT\_SWKN - kanał  
OT\_SWRM - rów melioracyjny

#### KU - KOMPLEKSY UŻYTKOWANIA TERENU

OT\_KUMN - kompleks mieszkaniowy  
OT\_KUPG - kompleks przemysłowo-gospodarczy  
OT\_KUHU - kompleks handlowo-usługowy  
OT\_KUKO - kompleks komunikacyjny  
OT\_KUSK - kompleks sportowy i rekreacyjny  
OT\_KUHO - kompleks usług hotelarskich  
OT\_KUOS - kompleks oświatowy  
OT\_KUOZ - kompleks ochrony zdrowia i opieki społecznej  
OT\_KUZA - kompleks zabytkowo-historyczny  
OT\_KUSC - kompleks sakralny i cmentarz  
OT\_KUIK - inny kompleks użytkowania terenu

#### BU - BUDYNKI, BUDOWLE I URZĄDZENIA

OT\_BUBD - budynek  
OT\_BUIN - budowla inżynierska  
OT\_BUHD - budowla hydrotechniczna  
OT\_BUSP - budowla sportowa  
OT\_BUWT - wysoka budowla techniczna  
OT\_BUZT - zbiornik techniczny  
OT\_BUUO - umocnienie drogowe, kolejowe i wodne  
OT\_BUZM - budowla ziemna  
OT\_BUTR - urządzenie transportowe  
OT\_BUIT - inne urządzenie techniczne  
OT\_BUCM - budowla cmentarna  
OT\_BUIB - inna budowla

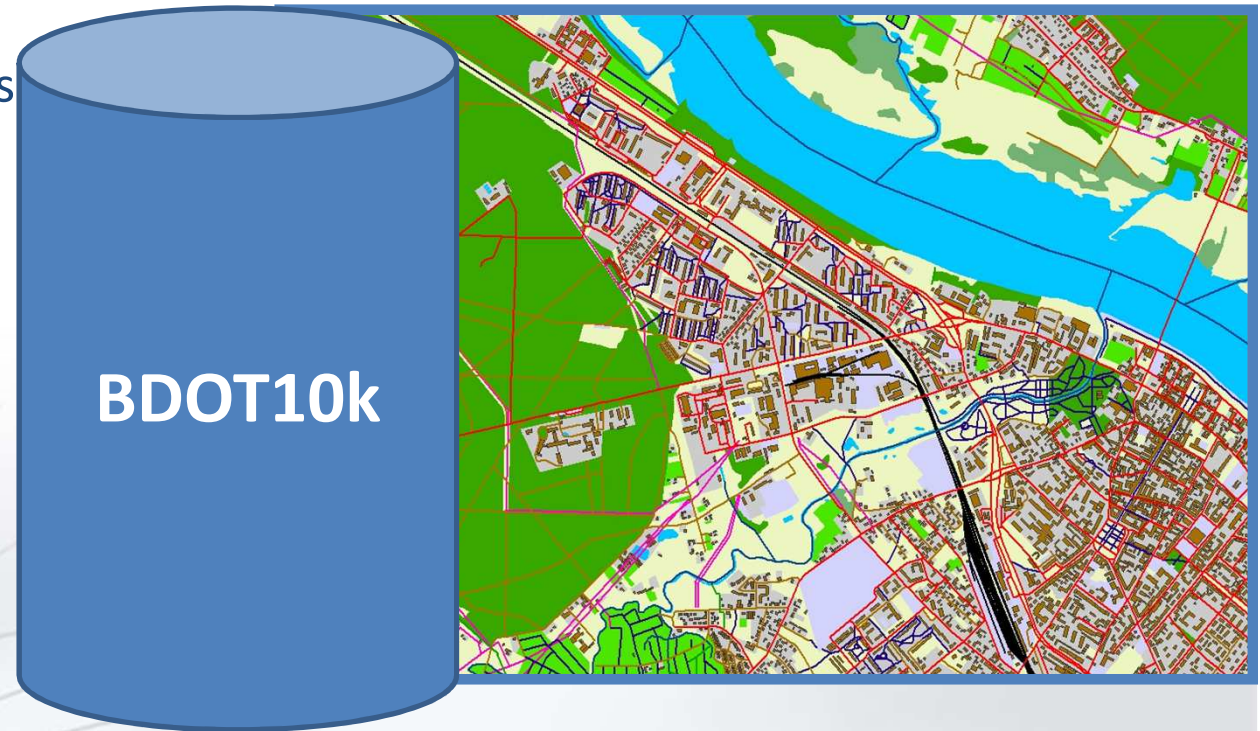
#### PT - POKRYCIE TERENU

OT\_PTWP - woda powierzchniowa  
OT\_PTZB - zabudowa  
OT\_PTLZ - teren leśny i zadrzewiony  
OT\_PTRK - roślinność krzewiasta  
OT\_PTUT - uprawa trwała  
OT\_PPTR - roślinność trawiasta  
OT\_PTKM - teren pod drogami kołowymi, szynowymi i lotniskowymi  
OT\_PTGN - grunt nieużytkowany  
OT\_PTPL - plac  
OT\_PTSD - składowisko odpadów  
OT\_PTWZ - wyrobisko i zwałowisko  
OT\_PTNZ - pozostały teren niezabudowany

# DATABASE OF TOPOGRAPHIC OBJECTS



- Administrative division units
- Road and railway networks
- Watercourse networks
- Utility networks
- Land cover complex
- Land usage complex
- Protected areas
- Buildings, structures and equipment
- Other objects





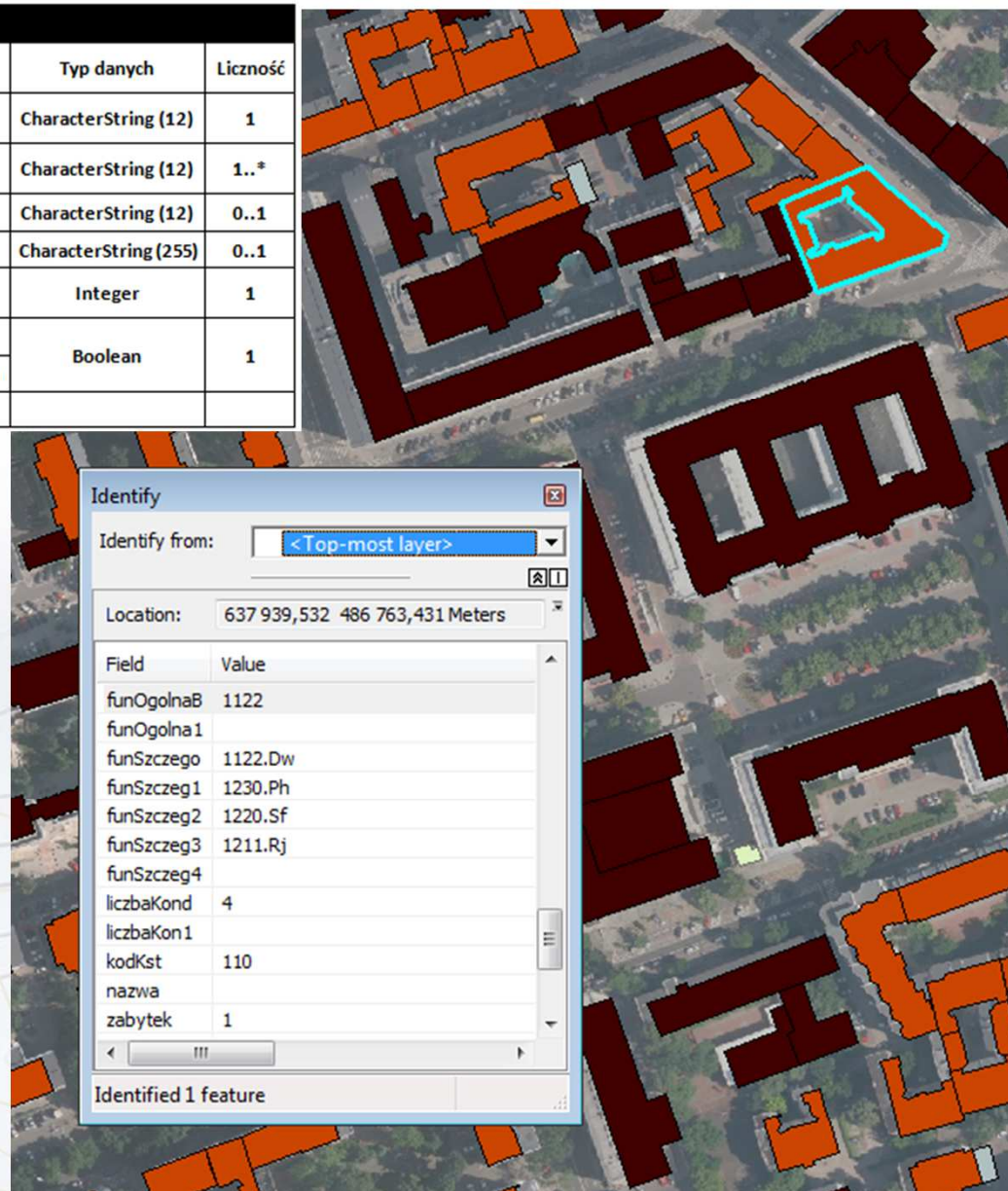
# BU - BUILDINGS, EDIFICES, EQUIPMENT



OT\_BUBD\_A – budynek

nazwa atrybutu	Nazwa słownika lub wykazu	Wartości	Typ danych	Liczność
funOgolnaBudynku <<voidable>>	OT_FunOgolnaBudynku		CharacterString (12)	1
funSzczegolowaBudynku <<voidable>>	OT_FunSzczegolowaBudynku		CharacterString (12)	1..*
kodKst			CharacterString (12)	0..1
nazwa			CharacterString (255)	0..1
liczbaKondygnacji <<voidable>>			Integer	1
zabytek		TRUE zabytek	Boolean	1
		FALSE budynek nie jest zabytkiem		
OT_ObjektTopograficzny				

	General Building Function	number of building function
1110	detached houses	3
1121	two apartment buildings	1
1122	buildings of three or more apartments	1
1130	collective lodging buildings	17
1211	hote buildings	6
1212	other touristic lodging buildings	5
1220	office buildings	21
1230	commerce and service buildings	9
1241	station and terminal communication buildings	15
1242	garage buildings	2
1251	industrial buildings	9
1252	tank, silo and warehouses	7
1261	general access kulture venues	10
1262	museum and library buildings	5
1263	school and research institution buildings	8
1264	hospital and healthcare buildings	11
1265	physical education buildings	10
1271	agricultural buildings	4
1272	religious worship buildings	10
1273	historical building	1
1274	other non residential buildings	9
		164



Identify

Identify from: <Top-most layer>

Location: 637 939,532 486 763,431 Meters

Field	Value
funOgolnaB	1122
funOgolna1	
funSzczego	1122.Dw
funSzczeg1	1230.Ph
funSzczeg2	1220.Sf
funSzczeg3	1211.Rj
funSzczeg4	
liczbaKond	4
liczbaKon1	
kodKst	110
nazwa	
zabytek	1

Identified 1 feature



# OBJECTS IN REFERENCE REGISTERS DATABASE (EXAMPLES)



## Sources of geometric data

Field  
measurement

Ortophotomap

Laser scanning



## Building

## Sources of attributes

Field interview

Branch  
Informational  
Systems



## Structure of attributes

### • General functions

	General Building Function	number of building function
1110	detached houses	3
1121	two apartment buildings	1
1122	buildings of three or more apartments	1
1130	collective lodging buildings	17
1211	hote buildings	6
1212	other touristic lodging buildings	5
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1265	physical education buildings	10
1271	agricultural buildings	4
1272	religious worship buildings	10
1273	historical building	1
1274	other non residential buildings	9
		164

### • Details functions

ID	OPIS
Tk	dworzec kolejowy
Tl	dworzec lotniczy
Ks	szkoła
Zo	ośrodek zdrowia

### • Number of storeys

### • Monument

### • Other



## 167 specific features:

- 1) single house,
- 2) summer house,
- 3) forester,
- 4) building with two flats,
- 5) multifamily building,

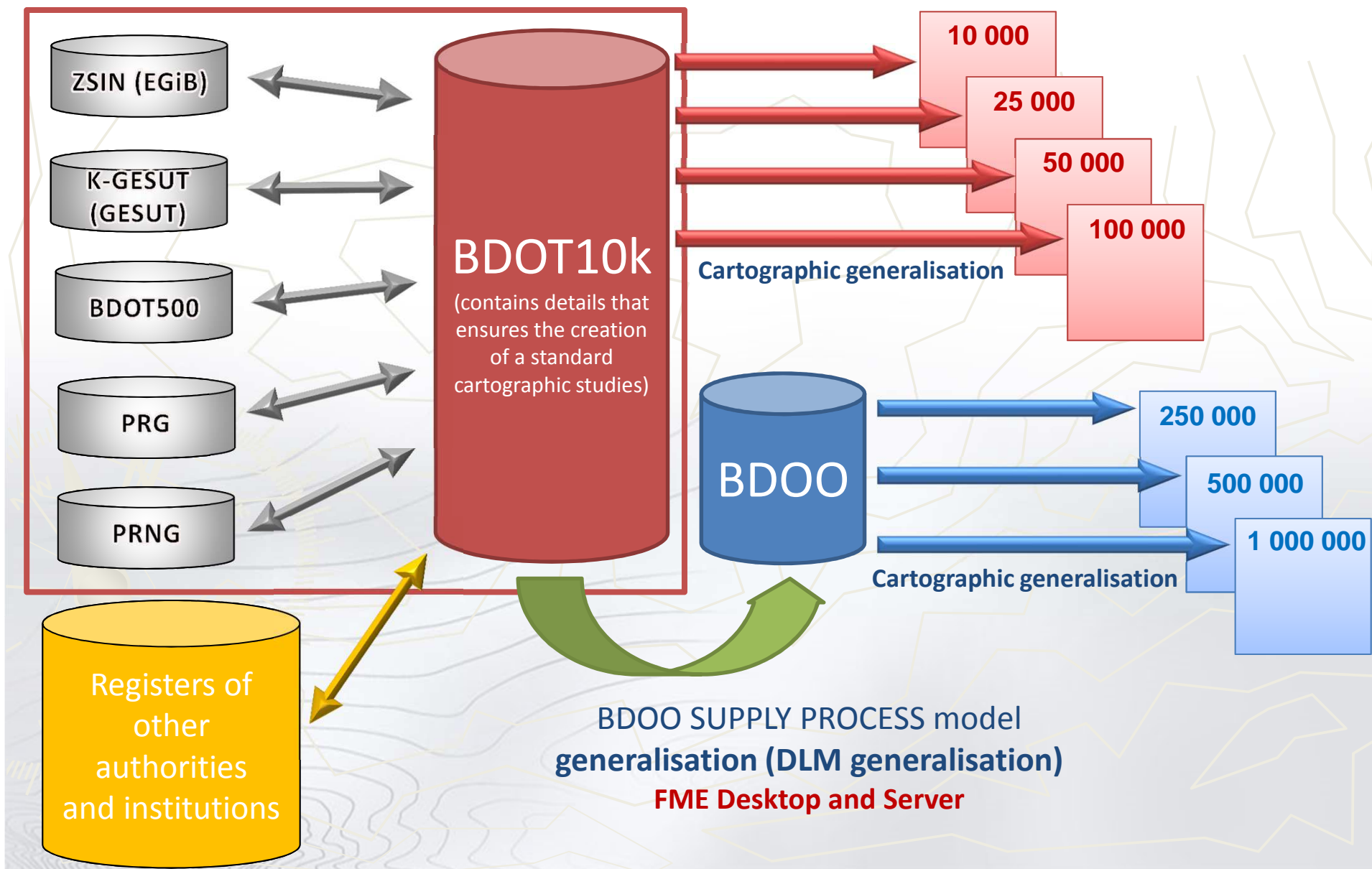
.....

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- 163) pump station,
- 164) transformer station,
- 165) public toilet,
- 166) barracks buildings,
- 167) penitentiary or correctional institution.

# COMMON CONCEPTUAL MODEL







- ✓ Short presentation of source data - BDOT10k
- ✓ **Transformation issues (mapping table, tools)**
- ✓ Conclusions



- ✓ BuildingsBase
  - ✓ **BuildingsCore2D** (for ELF project)
  - ✓ BuildingsExtended2D
- 
- ✓ OT\_BUBD\_A – buildings
  - ✓ OT\_BUWT – technical building
  - ✓ OT\_KUZA\_A – historical complex
  - ✓ OT\_BUHD – technical hydro buildings (dam)
  - ✓ OT\_BUZT – technical tanks

# Mapping table



mapowanie_Budynki_v4.7_ID.xlsx - Microsoft Excel										
A4 A building is an enclosed construction above and/or underground, used or intended for the shelter of humans, animals or things or for the production of economic goods. A building refers to										
Model INSPIRE dla tematu Budynki (BuildingsCore2D)							DANE TBD / BDOT			
Nazwa obiektu INSPIRE	Nazwa atrybutu	Stereotyp	Typ atrybutu	Liczność	Dopuszczalne wartości	Definicja	Nazwa obiektu w źródle	Nazwa atrybutu	liczność	stereotyp
Building	feature Type – Subtype of Building, inherits from AbstractConstruction, AbstractBuilding, Building						OT_SUBD_A, OT_BUWT, OT_KUZA_A, OT_BUHD, OT_BUZT			
beginLifespanVersion	voidable, lifeCycleIn	DateTime		1		Date and time at which this version of the spatial object was inserted or changed	x_orygZycia.początekWersji		1	
conditionOfConstruction	voidable	ConditionOfConstructionValue		1	Annex C: - declined – Non - demolished - functional – Eks, Tmo - projected - ruin – Zns - under construction – Bud	Status of the construction	x_KatIstnienia		1	voidable
dateOfConstruction	voidable	DateOfEvent		0..1		Date of construction				
dateOfDemolition	voidable	DateOfEvent		0..1		Date of demolition				
dateOfRenovation	voidable	DateOfEvent		0..1		Date of last major renovation				
elevation	voidable	Elevation		0..*		Vertically-constrained dimensional property consisting of an absolute measure referenced to a well-defined surface which is commonly taken as origin (geoid, water level, etc.)				
endLifespanVersion	voidable, lifeCycleIn	DateTime		0..1		Date and time at which this version of the spatial object was superseded or retired in the spatial data set	x_orygZycia.koniecWersji		0..1	
externalReference	voidable	ExternalReference		0..*		Reference to an external information system containing any piece of information related to spatial object				
heightAboveGround	voidable	HeightAboveGround		0..*		Height above ground				
inspireId		Identifier		1		External object identifier of the spatial object	LokalnyId przebiegNazw wersjaId		1 1 0..1	
name	voidable	GeographicalName		0..*		Name of construction				
buildingNature	voidable	BuildingNatureValue		0..*	Annex C: - arch - bunker - canopy - caveBuilding - chapel - castle - church - dam - greenhouse - lighthouse - mosque - shed - silo - stadium - storageTank - synagogue - temple - tower - windmill - windTurbine And values defined by data providers	Characteristic of the building that makes it generally of interest for mappings applications. The characteristic may be related to the physical aspect and/or to the function of the building.	funSzczegolowaBudynku rodzaj	1..* 1		voidable [brak]
currentUse	voidable	CurrentUse		0..*		Activity hosted within a building				
numberOfDwellings	voidable	Integer		0..1		Number of dwellings				
numberOfBuildingUnits	voidable	Integer		0..1		Number of building units in the building. A BuildingUnit is a subdivision of Building with its own lockable access from the outside or from a common area				



# Mapping table



Microsoft Excel - mapowanie_Budynki_v4.7_JD								
	A	B	C	D	E	F	G	H
1	Model INSPIRE dla tematu Budynki (BuildingsCore2D)							DANE TBD / BDOT
2	Nazwa obiektu INSPIRE	Nazwa atrybutu	Stereotyp	Typ atrybutu	Liczność	Dopuszczalne wartości	Definicja	Nazwa obiektu w źródle
3	Building	feature Type – Subtype of Building, inherits from AbstractConstruction, AbstractBuilding, Building						OT_BUDD_A, OT_BUWT, OT_KUZA_A
4		beginLifespanVersion	voidable, lifeCycleInfo	DateTime	1		Date and time at which this version of the spatial object was inserted or changed	x_cykIZycia.poczetek
5		conditionOfConstruction	voidable	ConditionOfConstructionValue	1	Annex C: - declined – Ncn - demolished - functional – Eks, Tmc - projected - ruin – Zns - under construction – Bud	Status of the construction	x_Katlstnienia
6		dateOfConstruction	voidable	DateOfEvent	0..1		Date of construction	
7		dateOfDemolition	voidable	DateOfEvent	0..1		Date of demolition	
8		dateOfRenovation	voidable	DateOfEvent	0..1		Date of last major renovation	
9		elevation	voidable	Elevation	0..*		Vertically-constrained dimensional property consisting of an absolute measure referenced to a well-defined surface which is commonly taken as origin (geoid, water level, etc.).	
10		endLifespanVersion	voidable, lifeCycleInfo	DateTime	0..1		Date and time at which this version of the spatial object was superseded or retired in the spatial data set.	x_cykIZycia.koniecW
11		externalReference	voidable	ExternalReference	0..*		Reference to an external information system containing any piece of information related to spatial object	
12		heightAboveGround	voidable	HeightAboveGround	0..*		Height above ground	
13		inspireId		Identifier	1		External object identifier of the spatial object	LokalnyId przestrzenNazw wersjaId
14		name	voidable	GeographicalName	0..*		Name of construction	
						Annex C: - arch - bunker - canopy - caveBuilding - chapel - castle - church - dam - greenhouse		

# Mapping table



Microsoft Excel - mapowanie\_Budynki\_v4.7\_JD

	G	H	I	J	K	L	M
1		DANE TBD / BDOT					
2	Definicja	Nazwa obiektu w źródle	Nazwa atrybutu	liczność	stereotyp	Dopuszczalne wartości	KOMENTARZE
3		OT_BUBD_A, OT_BUWT, OT_KUZA_A, OT_BUHD; OT_BUZT					
4	Date and time at which this version of the spatial object was inserted or changed		x_cykliZycia.początekWersjiObiektu	1			x_cykliZycia jest typem złożonym w BDOT10k
5	Status of the construction		x_Katlistnienia	1	voidable	If 'Eks' then 'functional' If 'Bud' then 'underConstruction' If 'Zns' then 'ruin' If 'Tmc' then 'functional' If 'Ncn' then 'declined' else: 'other:unknown'	
6	Date of construction					other unpopulated	brak odpowiednika w BDOT10k
7	Date of demolition					other unpopulated	brak odpowiednika w BDOT10k
8	Date of last major renovation					other unpopulated	brak odpowiednika w BDOT10k
9	Vertically-constrained dimensional property consisting of an absolute measure referenced to a well-defined surface which is commonly taken as origin (geoid, water level, etc.).						Data Type, tabela mapowań w zakładce BuildingsBase od wiersza 61
10	Date and time at which this version of the spatial object was superseded or retired in the spatial data set.		x_cykliZycia.koniecWersjiObiektu	0..1			x_cykliZycia jest typem złożonym w BDOT10k
11	Reference to an external information system containing any piece of information related to spatial object					other unpopulated	brak odpowiednika w BDOT10k
12	Height above ground						Data Type, tabela mapowań w zakładce BuildingsBase od wiersza 83
13	External object identifier of the spatial object		LokalnyId przestrzeniNazw wersjaId	1 1 0..1		localId = BU.Building.localnyId namespace = PL_PZGIK.202.ZKB DOT.3.2 versionId = wersjaId	inspireID składa się z trzech elementów: - LocalId jest stałe dla całego tematu - Namespace jest zależne od konkretnej klasy, lokalnyId to atrybut skopiowany z BDOT10k - versionId = wersjaId to atrybut skopiowany z BDOT10k
14	Name of construction						Data Type, tabela mapowań w zakładce ComplexTypes(Imported) od wiersza nr 1

BuildingsBase BuildingsCore2D BuildingsCore3D BuildingsExtended2D BuildingsExtended3D ComplexTypes(Imported) CodeList(Bas...



# Mapping table - CodeList(Base)



Microsoft Excel - mapowanie_Budynki_v4.7_JD							
	A	B	C	D	E	F	G
1	BuildingNature	OT_funSzczegolowaBudynku	BuildingNature	OT_funSzczegolowaBudynku	CurrentUse	OT_funOgolnaBudynku	OT_funSzczegolowaBudynku
2	DOTYCZY MODELU BASE		DOTYCZY MODELU EXTENDED		residential		
3	arch		arch		individualResidence	budynkiMieszkalneJednorodzinne	budynekJednorodzinny 1110.Dj lesniczowka 1110.Ls
4	bunker	bunkierSchron - Bun	bunker		collectiveResidence		
5	canopy	wiataAltana - Wal	canopy		twoDwellings	budynkiODwochMieszkaniach	budynekODwochMieszkaniach 1121.Db
6	caveBuilding		caveBuilding		moreThanTwoDwellings	budynkiOTrzechWiecejMieszkaniach	budynekWielorodzinny 1122.Dw
7	chapel	Kaplica - 1272.Kp	chapel	Kaplica - 1272.Kp	residenceForCommunities	budynkiZbiorowegoZamieszkania	bursaSzkolna 1130.Bs domDlaBezdomnych 1130.Db domDziecka 1130.Dd domOpiekiSpolecznej 1130.Os domParafialny 1130.Dp domStudencki 1130.Ds domZakonny 1130.Dz hotelRobotniczy 1130.Hr internat 1130.In klasztor 1130.Kl koszary 1130.Km placowkaOpiekunczoWychowawcza 1130.Po rezydencjaAmbasadora - 1130.Ra rezydencjaBiskupia - 1130.Rb rezydencjaPrezydencka - 1130.Rp zakladKarny 1130.Zk zakladPoprawczy 1130.Zp
8	castle	twierdzaForteca - Twf zespolPalacowy - Zpl ZespolZamkowy - Zzm	castle	twierdzaForteca - Twf zespoleniowy - Zpl ZespolZamkowy - Zzm	agriculture	budynekGospodarstwaRolnego	budynekGospodarczy 1271.Bg budynekProdukcyjnyZwierzątHodowlanych 1271.Bp stajnia 1271.St baczka = 1274.Bc
9	church	kosciol - 1272.Ks cerkiew - 1272.Ck	church	kosciol - 1272.Ks cerkiew - 1272.Ck	industrial	BudynkiPrzemyslowe	elektrociepłownia = 1251.El elektrownia = 1251.Ek kotłownia = 1251.Kt młyn = 1251.Mn produkcyjny = 1251.Pr rafineria = 1251.Rf spalniaSmieci = 1251.Ss warsztatRemontowoNaprawczy = 1251.Wr wiatrak = 1251.Wt stacjaGazowa = 1274.Sg stacjaPomp = 1274.Sp stacjaTransformatorowa = 1274.St
	dam	jazRuchomyLubZastawkaPiętrza - Jry jazStały - Jsy zapora - Zap	dam			zbiornikSilosBudynkiMagazynowe	chłodnia 1252.Ch elewator 1252.El magazyn 1252.Mg budynkiSędzi - 1253.Sc

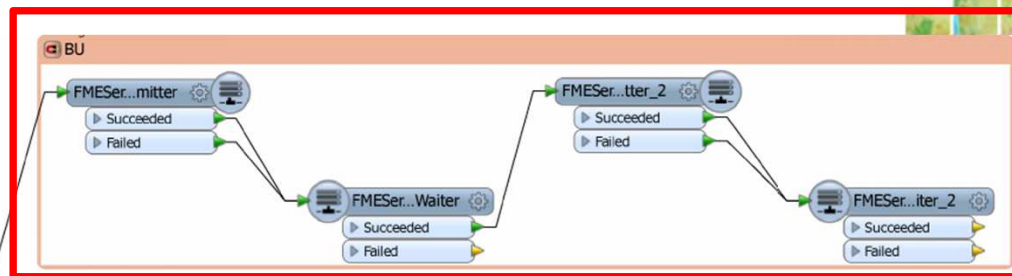




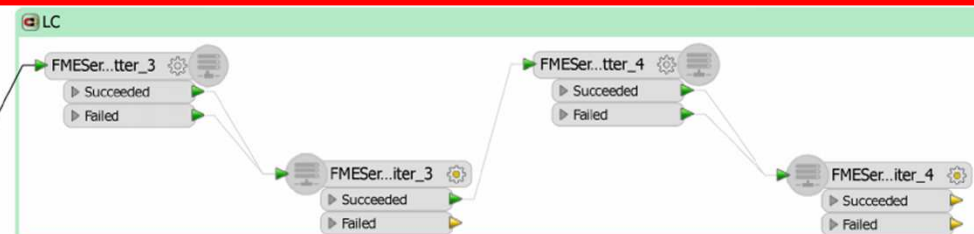
## FME - Master proces for all themes



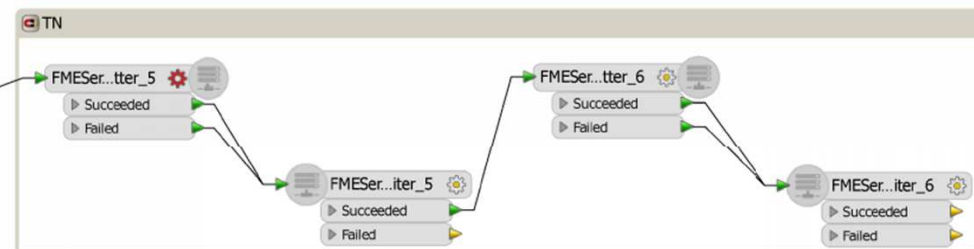
BU



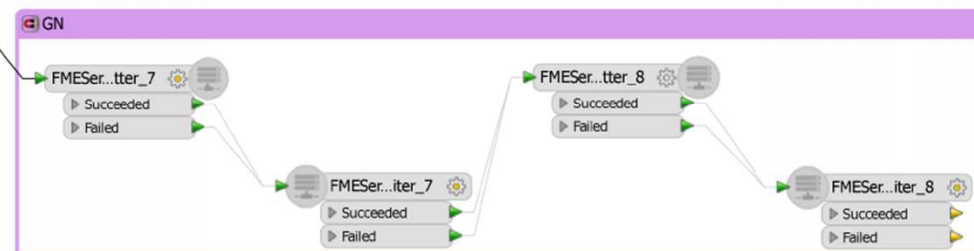
faza testów beta



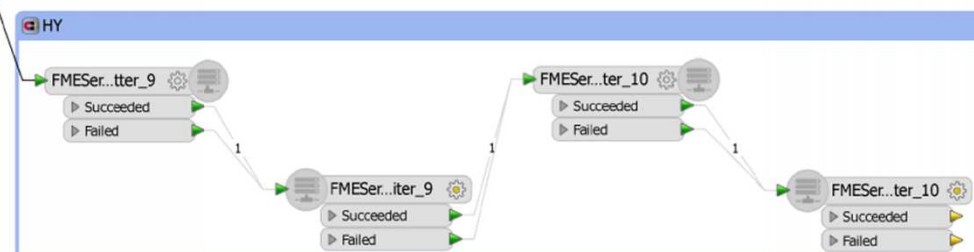
faza testów alfa



??



60%



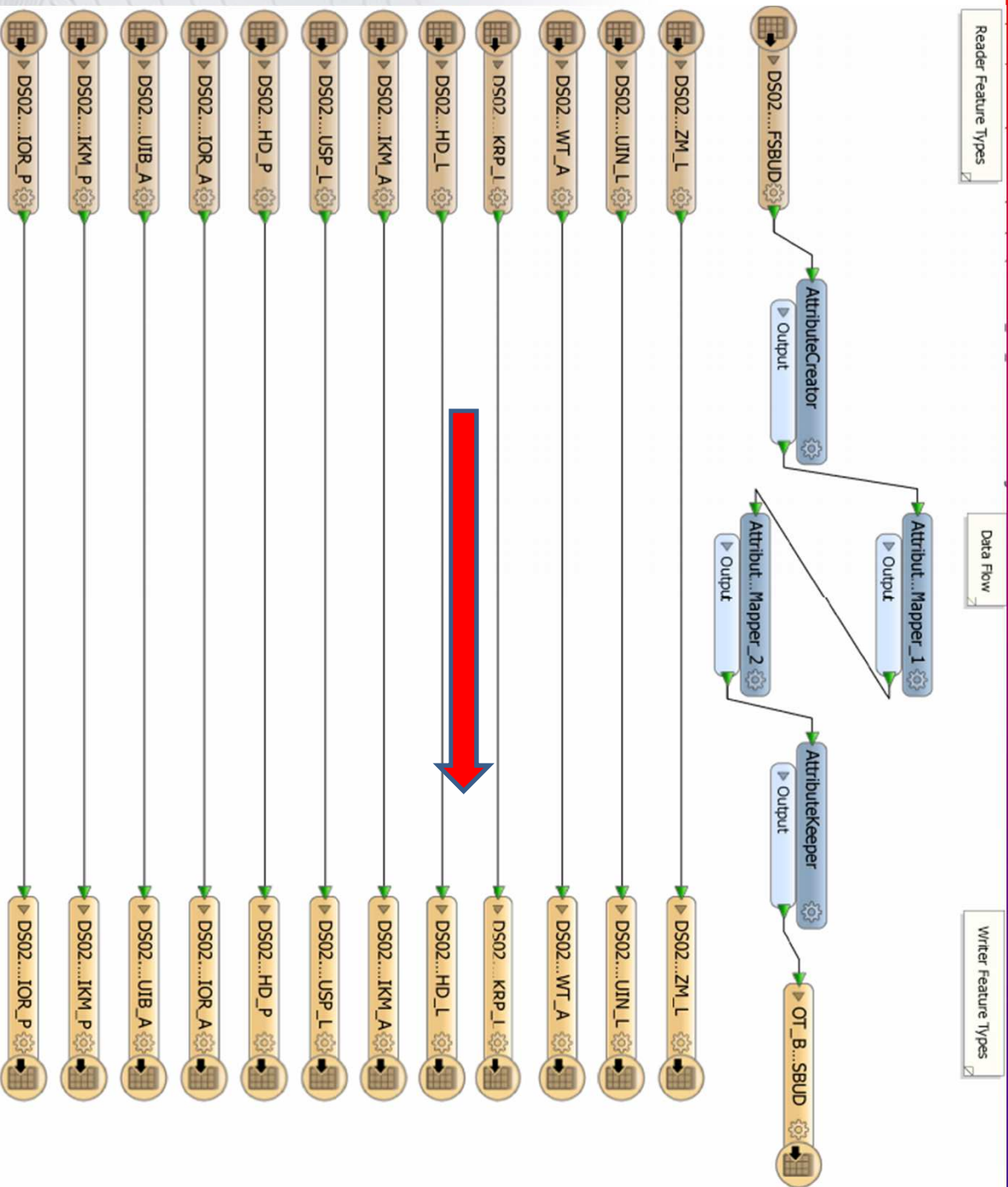
faza testów alfa

id != 1378 or  
id != 1386 or  
id != 1360 or  
id != 1387 or  
id != 1381 or  
id != 1372 or  
id != 1385 or  
id != 1383  
  
id = \$(id\_powiatu)



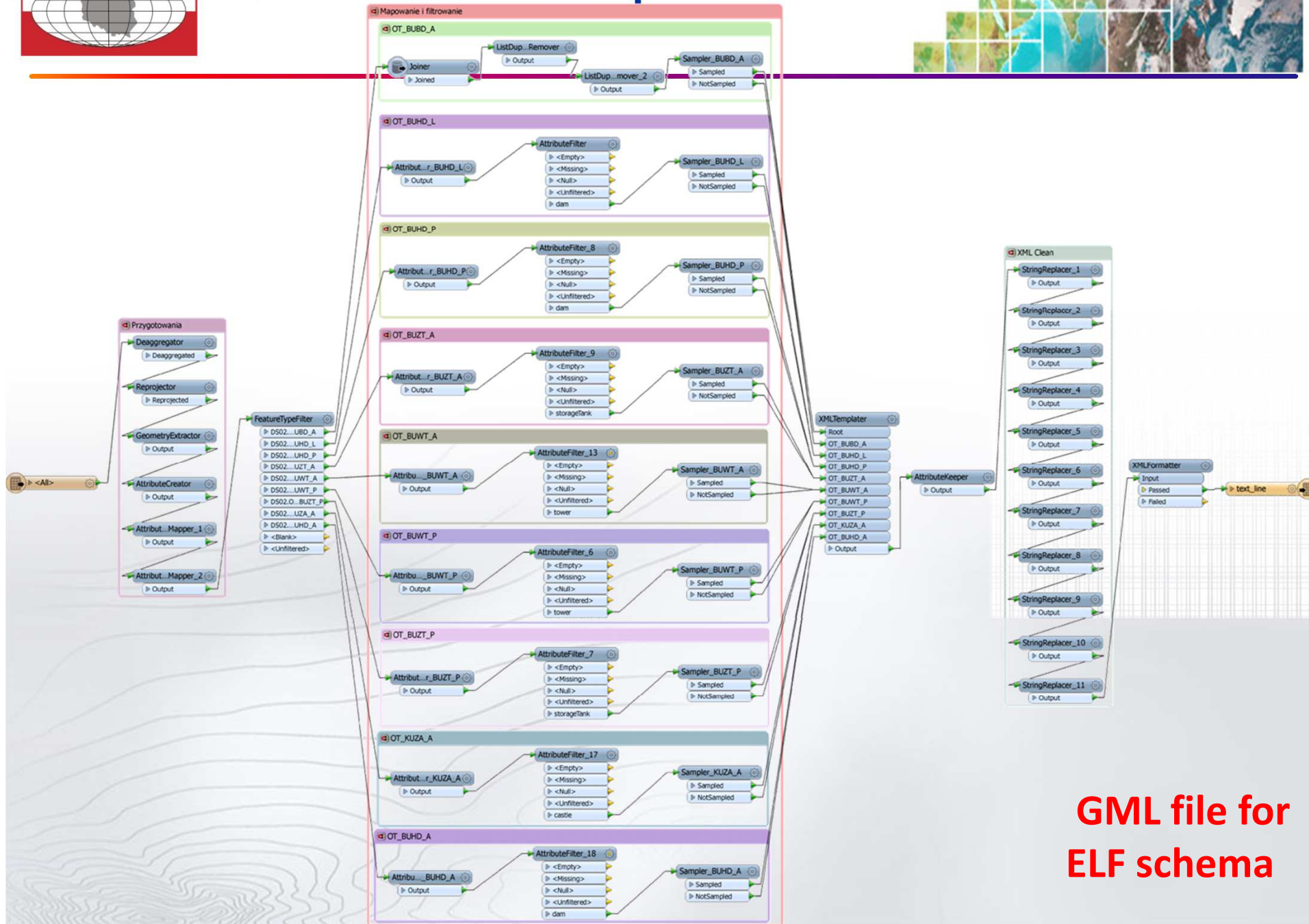
FME  
Server

# FME – Subprocess



FFS file for spatial data and  
Excel file for nospatial data

# FME – Main process



**GML file for  
ELF schema**





- ✓ Short presentation of source data - BDOT10k
- ✓ Transformation issues (mapping table, tools)
- ✓ **Conclusions**

# Conclusions



- ✓ It takes 31 hours to process buildings theme to GML files for Poland
- ✓ FME workbench is easy to change, there's no need to develop
- ✓ Fully automated proces
- ✓ It's very easy to change process to generate GML files for INSPIRE

# Example of GML



```
<?xml version="1.0" encoding="UTF-8"?>
<gml:FeatureCollection xmlns:xlink="http://www.w3.org/1999/xlink" xmlns:gmd="http://www.isotc211.org/2005/gmd" xmlns:gn=
"urn:x-inspire:specification:gmlas:GeographicalNames:3.0" xmlns:bu-base="http://inspire.ec.europa.eu/draft-schemas/bu/3.0rc3" xmlns:gml=
"http://www.opengis.net/gml/3.2" xmlns:base="http://inspire.ec.europa.eu/schemas/base/3.3rc3/" xmlns:bu-core2d=
"http://inspire.ec.europa.eu/draft-schemas/bu-core2d/3.0rc3" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:baseX=
"urn:x-inspire:specification:gmlas:BaseTypes:3.2" xmlns="http://www.locationframework.eu/schemas/Buildings/MasterLoD0/1.0" xsi:schemaLocation=
"http://www.locationframework.eu/schemas/Buildings/MasterLoD0/1.0 LoD0_Buildings.xsd http://www.opengis.net/gml/3.2
http://schemas.opengis.net/gml/3.2.1/gml.xsd" gml:id="ELF_BU_PL_1464">
  <gml:featureMember>
    <Building gml:id="Building.BUBD_A.F7012A4FB5838B49E043CC2BA8C0C250">
      <bu-base:beginLifespanVersion>2013-01-01T00:00:00</bu-base:beginLifespanVersion>
      <bu-base:conditionOfConstruction xlink:href="http://inspire.ec.europa.eu/codeList/ConditionOfConstructionValue/functional"/>
      <bu-base:inspireId>
        <base:Identifier>
          <base:localId>BU.Building.F7012A4FB5838B49E043CC2BA8C0C250</base:localId>
          <base:namespace>PL.PZGiK.330.BDOT10k.BU.3.2</base:namespace>
          <base:versionId>2013-01-01T00:00:00</base:versionId>
        </base:Identifier>
      </bu-base:inspireId>
      <bu-base:buildingNature xsi:nil="true" nilReason="unknown"/>
      <bu-base:currentUse xlink:href="http://inspire.ec.europa.eu/codeList/CurrentUse/office"/>
      <bu-base:numberOfFloorsAboveGround>2</bu-base:numberOfFloorsAboveGround>
      <bu-base:parts xsi:nil="true" nilReason="unpopulated"/>
      <bu-core2d:geometry2D>
        <bu-base:BuildingGeometry2D>
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            <gml:Polygon gml:id="id-5d635b57-360f-4948-bb67-df0acd74a964-0" srsName="urn:ogc:def:crs:EPSG:4258" srsDimension="2">
              <gml:exterior>
                <gml:LinearRing>
                  <gml:posList>52.1319823646822 22.2418150213299 52.1319885565854 22.2418254126041 52.1319325240784 22.2419130066842
                    52.1318472299379 22.2417692384634 52.1319031725483 22.2416816378371 52.131909364464 22.2416920290743 52.131956938289
                    22.2416175627063 52.1320298528087 22.2417404025489 52.1319823646822 22.2418150213299</gml:posList>
                </gml:LinearRing>
              </gml:exterior>
            </gml:Polygon>
          </bu-base:geometry>
        </bu-base:BuildingGeometry2D>
      </bu-core2d:geometry2D>
    </Building>
  </gml:featureMember>
</gml:FeatureCollection>
```



# Thank you for Your attention

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