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EMBRACING OUR SMART WORLD WHERE THE CONTINENTS CONNECT: **ENHANCING THE GEOSPATIAL MATURITY OF SOCIETIES** 6-11 May 2018, İstanbul

# Round Table: How to exchange Surveying Data with IFC?

Chair: Christian Clemen





















## **Questions:**

- 1. For which purpose do you use IFC?
- stake out
- large scale facility management / maintaining (roads, airports,..)
- 3D cadastre / property /boundaries /
- geographical context for design (deliver ifc to planers)
- delivers as-built models as IFC + quality check





















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Questions:

- 2. Which BIM Software are you working with
- Revit (design Company)
- Structural Software (Tekla)
- Infraworks/Navisworks
- Agisoft for data capture
- ArchiCAD (good IFC export), Allplan, Sketchup
- BIMServer.org ifc-database / EDM Jotne
- FME / Dynamo























# Questions:

- 3. What should be improved?
- Main problem: more simplicity would be good
- Georeferencing for planning (link IFC directly)



















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- Pessimistic assumption: Building Models in IFC are not perfectly referenced in practice.
- The higher the LoGeoRef is the more quality of georeferencing
- higher levels do not automatically include information out of lower levels. Each level comprises their own IFC-schema attributes and is standing on its own.
- Decimal steps / intermediate steps possible e.g. for elevation, quality of attribute values, project-specific extentions...







20





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**50** 

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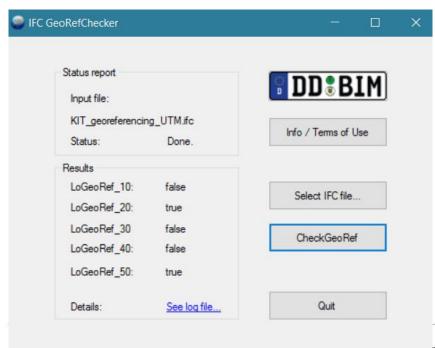


10

## Level of Georeferencing (LoGeoRef) for BIM data drops



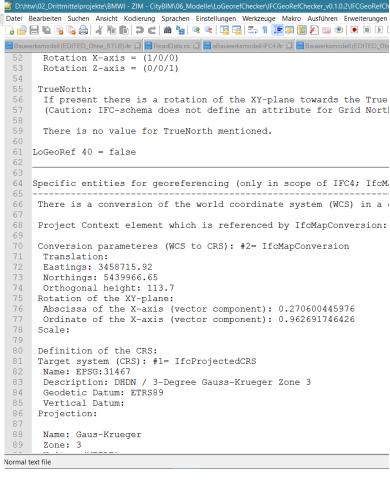
### **Easy to use Checker**





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### Simple Result: Logfile

























## Level of Georeferencing (LoGeoRef) for BIM data drops

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UML class diagram for IfcSpatialStructureElement Level of GeoRef 10 #445 IFCROSTALADORESS (.SITE...) Address 1), 5, Dresden, Saxony, 1069, IELEMENT, 1069, IELEMEN +IfcRoot.Globalld +IfcRoot.OwnerHistory (IFC schema extract) +IfcRoot.Name[0..1] +IfcRoot.Description[0..1] +lfcObject.ObjectType[0..1] legend: +IfcProduct.ObjectPlacement[0..1] +IfcProduct.Representation[0..1] +IfcSpatialElement.LongName[0..1] abstract IFC entity important +CompositonType «dataType» (IFC) type IfcSite +RefLatitude: IfcCompoundPlaneAngleMeasure **IfcBuilding** +RefLongitude: IfcCompoundPlaneAngleMeasure +RefElevation: IfcLengthMeasure +ElevationOfRefHeight +LandTitleNumber +ElevationOfTerrain +SiteAddress: IfcPostalAddress +BuildingAddress: IfcPostalAddress For fulfillment: one of them must be given +SiteAddress +BuildingAddress **IfcPostalAddress** +IfcAddress.Purpose 0..1 +IfcAddress.Description +AdressLines «primitiveType» +IfcAddress.UserDefinedPurpose String (255) +InternalLocation <dataType> +AddressLines: IfcLabel[0..1] IfcLabel 0..1 +PostalBox +Town: IfcLabel[0..1] +Region: IfcLabel[0..1] «primitiveType» String (255) +PostalCode: IfcLabel[0..1] IfcLabel +Country: |fcLabe|[0..1] HOCHSCHULE FÜR











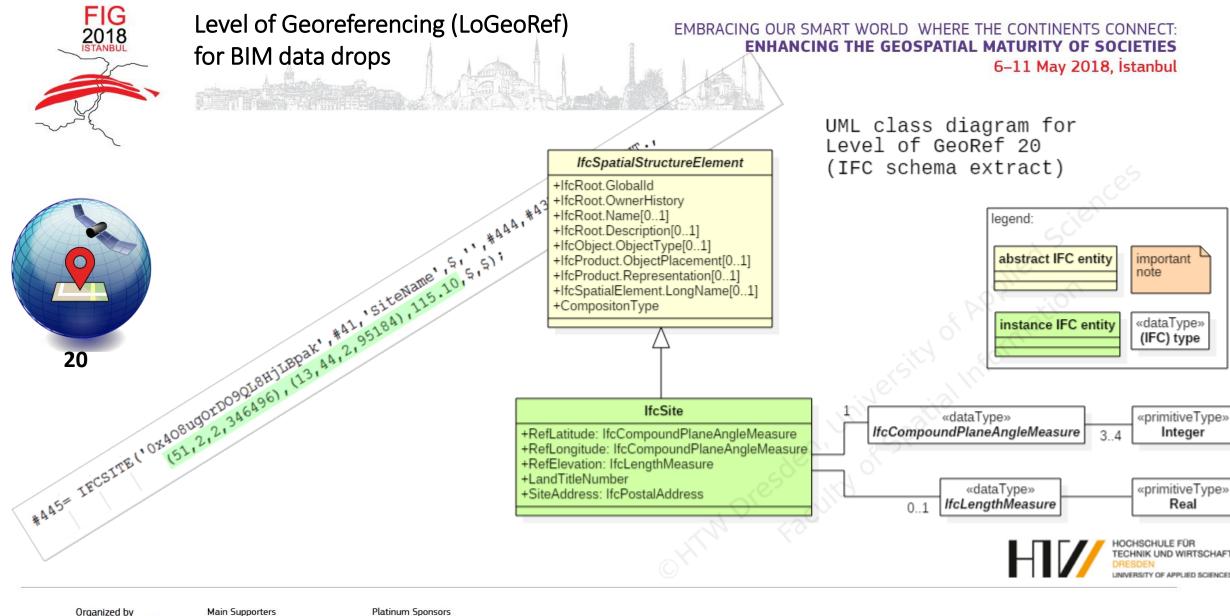




































Level of Georeferencing (LoGeoRef) for BIM data drops

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UML class diagram for



#69182= IFCCARTESIANPOINT((5656243.561,5411838.574,0.));
#69183= IFCDIRECTION((0.,0.,1.)); #69183= IFCDIRECTION((0.94640939062909,0.322969449529013,0.));
#69184= IFCDIRECTION((0.94640939062909,0.322969449529013,0.));
#69184= IFCAXIS2PLACEMENT3D(#69182,#69183,#69184); #69187 | IECLOCALPLACEMENT (\$, #69186); CNSN', #41, SiteName', \$1,48,669204), 0.1
#69188 | IECSITE ('1fhwSaVqX40wpLil') (48,8,20,852966); (11,34,48,669204), 0.1
#69188 | #69187, #69180, \$, ELEMENT. #69184 IFCDIRECTION((0.94640939062909,0.3229694495);
#69186 IFCAXIS2PLACEMENT3D(#69182,#69186);
#69187 TECTOCAL, PLACEMENT (5. #69186); #69186= IECAXIS2PLACEMENT3D (#69182, #69186); CNS.
#69187= IECLOCALPLACEMENT (\$, #69187); CNS.
#69187= TEGETME (1) France VICX AGMOTTIVE (1)

legend:









Level of GeoRef 30 IfcSpatialStructureElement (IFC schema extract) For fulfillment: +IfcRoot.GlobalId subclass must be of type fcLocalPlacement +IfcRoot.OwnerHistory +IfcRoot.Name[0..1] +IfcRoot.Description[0..1] For fulfillment: +IfcObject.ObjectType[0..1] +ObjectPlacement PlacementRelTo: must be empty +IfcProduct.ObjectPlacement: IfcObjectPlacemen RelativePlacement: must be of type +IfcProduct.Representation[0..1] fcAxisPlacement3D +IfcSpatialElement.LongName[0..1] -CompositonType IfcObjectPlacement IfcLocalPlacement +PlacementReITo: IfcObjectPlacement = NULL +RelativePlacement: IfcAxis2Placement3D +RelativePlacement **IfcSite** IfcBuilding IfcAxis2Placement3D +Location +RefLatitude +ElevationOfRefHeight IfcPlacement.Location: IfcCartesianPoint +RefLongitude +ElevationOfTerrain +Axis: IfcDirection[0..1] +RefElevation +BuildingAddress +RefDirection: IfcDirection[0..1] +LandTitleNumber +SiteAddress IfcBuildingStorey **IfcSpace** +RefDirection +Elevation +PredefinedType IfcDirection «dataTvpe» +ElevationWithFlooring +DirectionRatios: IfcRea IfcReal 0..1 For fulfillment: +Axis at least one of the subclasses IfcDirection must be implemented with the named conditions «primitiveType» +DirectionRatios: IfcRea Real 0..1 **IfcCartesianPoint** +Coordinates: IfcLengthMeasure «dataType» «primitiveType» IfcReal Real abstract IFC entity important «dataType» lfcLengthMeasure instance IFC entity «dataType» For fulfillment: (IFC) type at least one of the components «primitiveType» must be greater than zero Real HOCHSCHULE FÜR TECHNIK UND WIRTSCHAF

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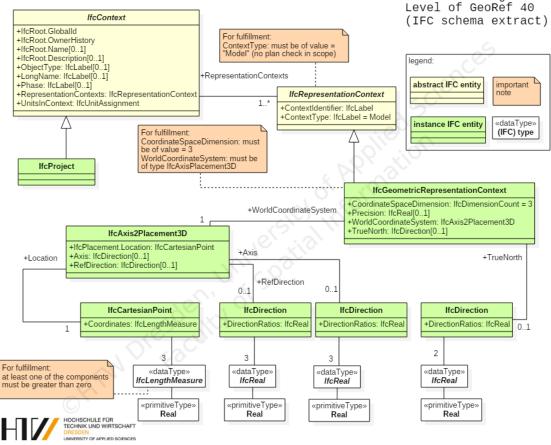


#89= IFCCARTESIANPOINT ((5656243.561,5411838.574,115.1));
#89= IFCCARTESIANPOINT ((5656243.561,5411838.574,115.1)); 

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UML class diagram for



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IfcProject

+RepresentationContexts

+SourceCRS

+TargetCRS

«dataType»

IfcReal

«primitiveType: Real

For fulfillment:

+Precision: IfcReal[0..1]

+Name: IfcLabel

+TrueNorth: IfcDirection[0..1]

IfcCoordinateReferenceSystem

+GeodeticDatum: IfcIdentifier[0

+VerticalDatum: IfcIdentifier[0..1]

IfcProjectedCRS

+MapProjection: IfcIdentifier[0..1]

+Name: IfcLabel

+MapZone: IfcIdentifier[0..1]

+MapUnit: IfcNamedUnit[0..1]

+Description: IfcText[0..1]

ContextType: must be of value =

Model" (no plan check in scope)

IfcRepresentationContext

+ContextType: IfcLabel = Model

**IfcGeometricRepresentationContext** 

+CoordinateSpaceDimension: IfcDimensionCount =

+WorldCoordinateSystem: IfcAxis2Placement

+ContextIdentifier: IfcLabel

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or fulfillment:

be of value = 3

«dataType»

IfcLabel

«dataType

*IfcText* 

«dataType»

lfcldentifier

+MapUnit

**IfcNamedUnit** 

+Dimensions

+UnitType

CoordinateSpaceDimension: must

EPSG-Code

«primitiveType»

String (255)

«primitiveType»

String

«primitiveType»

String (255)

subclasses for

degree or metre

units like

IfcSIUnit

+Name: IfcSIUnitName

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+Prefix: IfcSIPrefix

UML class diagram for

(IFC schema extract)

Level of GeoRef 50



#102= IFCMAPCONVERSION(#111,#112,3458715,92,5439966.65,113.7,40,\$);

#102= IFCMAPCONVERSION(#111,#112,3458715,92,5439966.65,113.7,40,\$);

#102= IFCMAPCONVERSION(#111,#112,3458715,92,5439966.65,113.7,40,\$);

#102= IFCMAPCONVERSION(#111,#112,3458715,92,5439966.65,113.7,40,\$);

#102= IFCMAPCONVERSION(#111,#112,3458715,92,5439966.65,113.7,40,\$);

#102= IFCMAPCONVERSION(#111,#112,3458715,92,5439966.65,113.7,40,\$);

#102= IFCMAPCONVERSION(#111,#112,3458715,92,5439966.65,113.7,40,\$);

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#112= IFCMAPCONVERSION(#111,#112,3458715,92,5439966.65,113.7,40,\$);

#112= IFCMAPCONVERSION(#111,#112,3458715,92,5439966.65,113.7,40,\$);

#112= IFCMAPCONVERSION(#111,#112,3458715,92,5439966.65,113.7,40,\$);

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#112= IFCMAPCONVERSION(#111,#112,3458715,92,5439966.65,113.7,40,\$);

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#112= IFCMAPCONVERSION(#111,#112,3458715,92,5439966.65,113.7,40,\$);

#112= IFCMAPCONVERSION(#111,#112,3458715,92,5439966.65,113.7,40,\$);

#112= IFCMAPCONVERSION(#111,#112,3458715,92,5439966.65,113.7,40,\$);

#1120= IFCSIUNIT(\*\*, LENGTHUNIT\*, \$\*, METRE.);

#1120= IFCSIUNIT(\*\*, LENGTHUNIT\*, \$\*, METRE.);

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**IfcContext** 

+RepresentationContexts: IfcRepresentationContex

IfcCoordinateOperation

+SourceCRS: IfcGeometricRepresentationContext +TargetCRS: IfcCoordinateReferenceSystem

IfcMapConversion

+Eastings: IfcLengthMeasure

+XAxisAbscissa: IfcReal

+XAxisOrdinate: IfcReal

abstract IFC entity

instance IFC entity

+Scale: IfcReal

legend:

+Northings: IfcLengthMeasure +OrthogonalHeight: IfcLengthMeasur

+IfcRoot.GlobalId

+IfcRoot.OwnerHistory

+Phase: IfcLabel[0..1]

For fulfillment:

+IfcRoot.Description[0..1] +ObjectType: IfcLabel[0..1 +LongName: IfcLabel[0..1]

+UnitsInContext: IfcUnitAssignment

cGeometricRepresentationContext

SourceCRS: must be of type

+IfcRoot.Name[0..1]



mportant

«dataTvpe»

(IFC) type



IfcConversionBasedUnit

+ConversionFactor: IfcMeasureWithUnit