

Flow of Events for Use Case – Define Land Parcel

Change Log	
13/06/2004	Created This use case replaces the previous use cases ‘Set Property Boundary’, ‘Propose Property Boundary’ and ‘Accept or Reject Property Boundary’.

Overview

The purpose of this use case is to determine the boundary line of a land parcel, to propose changes to a boundary line that already exists and to accept/reject a boundary line or proposed changes.

The boundary line of a land parcel is the ‘cadaster’ and requires that the individual lines forming the contiguous boundary be defined and identified. Such lines delineate legal boundaries and ownership.

Terminology

Cadaster	An official register showing details of ownership, boundaries, and value of real property in a district, made for taxation purposes <i>Source: The Collins English Dictionary © 2000 HarperCollins Publishers</i>
Cadastral line	A line or curve forming a single segment of a property boundary and which references the two properties on either side of it.

Within an IFC context, a land parcel is considered to be a spatial type of space. The nearest entity match to the concept within IFC 2x2 is that of a site (IfcSite). A site is defined as ‘*A defined area of land, possibly covered with water, on which the project construction is to be completed. A site may be used to erect building(s) or other AEC products*’. This does not match the precise concept of a land parcel since a parcel could contain several sites or a site contain several land parcels.



Figure 1: Image showing parcel boundaries

Process

Preconditions

None when initially defining the land parcel

A land parcel exists and is identified when proposing boundary changes.

The boundary specification for a land parcel must be known or proposed to enable its acceptance or rejection.

Actor

Applicant (for proposals)

Authority (for acceptance/rejection)

Main Flow

1. Determine whether parcel and its boundary are being initially created, a modification proposed or a boundary/modification being accepted or rejected.
 - If the parcel and boundary are being created then <S1>
 - If a modification to the boundary is being proposed then <S2>
 - If a boundary or a modification of a boundary is being accepted or rejected then <S3>

Subflows

S1: Set Parcel Boundary

Flow	Entity
1. Determine the placement origin for the property (used as the datum of the local coordinate system for all geometric representation items used to represent the property).	IfcPoint
2. Place the extents of the land parcel using the use case 'Place 2D Spatial Shape'	IfcShapeRepresentation
3. The representation identifier is set to 'Cadaster'.	IfcShapeRepresentation.Identifier
4. Determine the identity of the property on each side of the cadaster. <ul style="list-style-type: none">• The cadaster needs to consider each segment of the property boundary as a curve in its own right, the curve being the manifestation of a relationship between two properties.• Therefore, each segment of the cadaster needs to capture a binary relationship between two 'physical properties'.	IfcSpace
5. Assert the identity of the property on each side of the cadaster through a relationship object that determines the relation between spatial structures (IfcRelConnectsElements). <ul style="list-style-type: none">• Depending on the physical adjacency, any type of curve might be selected to represent a cadaster.• Since adjacent properties should be touching at their boundaries, CAD or GIS applications should not have difficulty in determining relating/related property.	IfcRelConnectsElements

S1a: Use existing cadastre

Flow	Entity
1. Determine the coordinates of the existing curve	IfcCurve, IfcPolyline, IfcPoint
2. Add the curve to the set of curves that will form the boundary.	

S1b: Make new cadastre

Flow	Entity
1. Determine the type of curve to connect from the current point to the previous point	IfcCurve
2. Create the line	IfcCurve
3. Add the line to the set of lines that will form the boundary.	IfcCurve

S2: Propose Parcel Boundary

Flow	Entity
1. Determine the parcel/parcels for which a new boundary is to be proposed.	IfcSpace
2. Determine the boundary of the parcel, namely the individual cadasters.	IfcShapeRepresentation
3. Copy the existing boundary and all relationships that exist between parcels at the boundary lines.	IfcShapeRepresentation
4. Edit the existing boundary either by adjusting start and end points of the boundary lines or by inserting new lines into the boundary specification or by deleting existing boundary lines or by a combination of the above.	
5. As lines are edited, add new details of the line to the boundary list.	
6. As a line is edited, test the relationship that exists between parcels and adjust as required. Where a new parcel is being inserted, thus requiring the boundary change, the relationship may not be able to be fully asserted until the new parcel and its boundary are fully defined.	
7. Create an instance of IfcSpace to designate the physical property within the proposed boundary.	IfcSpace
8. Identify the new instance of space as 'proposed' and copy relationships from the existing parcel to the proposed parcel <ul style="list-style-type: none">At this point, both the existing parcel and the proposed parcel should exist and all relationships for the parcels should be fully asserted in both cases.	IfcSpace
9. Create a proposed boundary (cadaster) of the parcel in the same way as for 'Set Parcel Boundary' above. The representation identifier is set to	IfcSpaceBoundary IfcRepresentationItem IfcShapeRepresentation.RepresentationIdentifier = 'ProposedCadaster'

<p>IfcShapeRepresentation.RepresentationIdentifier = 'ProposedCadaster'</p> <ul style="list-style-type: none"> At this point, both the existing boundary and the proposed boundary should exist and all relationships for the boundary should be fully asserted in both cases. 	
---	--

S3: Accept/Reject Parcel Boundary

Flow	Entity
<ol style="list-style-type: none"> Decision is taken to either accept or reject proposed changes to parcel boundaries. <ul style="list-style-type: none"> If proposed changes to parcel boundaries are accepted then. <S3a> If proposed changes to parcel boundaries are rejected then <S3b> 	IfcApproval

S3a: Accept Proposed Parcel Boundaries

Flow	Entity
<ol style="list-style-type: none"> Existing parcel and parcel boundaries have their planning status changed to deleted. 	
<ol style="list-style-type: none"> Relationships on the existing parcel and parcel boundaries are marked for deletion. Use the IfcOwnerHistory.ChangeAction (with value set to deleted). Note that this requires applications to use a separate instance of owner history for these entities. 	IfcOwnerHistory.ChangeAction
<ol style="list-style-type: none"> Proposed parcel and parcel boundaries have their planning status changed to accepted. 	IfcProjectOrder.ProjectStatus
<ol style="list-style-type: none"> On completion of practical changes to the boundary, existing entities marked for deletion can be deleted. This includes parcels, boundaries and relationships. 	
<ol style="list-style-type: none"> Proposed parcels and boundaries whose planning status is currently set to accepted have their planning status changed to actual, thus designating that they now define the existing state. 	IfcProjectOrder.ProjectStatus
<ol style="list-style-type: none"> Depending on requirements, deleted entities may be stored for historical reasons. Each deletion may be identified through version control. 	IfcProjectOrderRecord.PredefinedType=PLANNINGAPPLICATION

S3b: Reject Proposed Parcel Boundaries

Flow	Entity
<ol style="list-style-type: none"> All proposed changes are deleted 	
<ol style="list-style-type: none"> Depending on requirements, proposed changes may be stored with reference to the planning status being changed to rejected. Changes in planning status may be identified through version control. 	IfcProjectOrder.ProjectStatus IfcProjectOrderRecord.PredefinedType=PLANNINGAPPLICATION

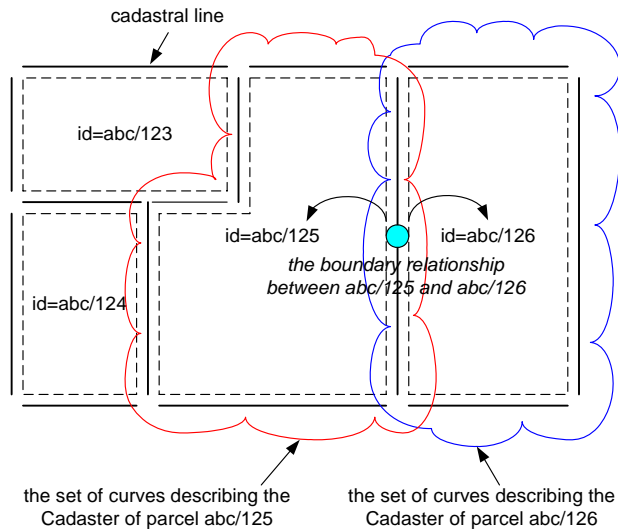


Figure 2: Setting parcel boundary

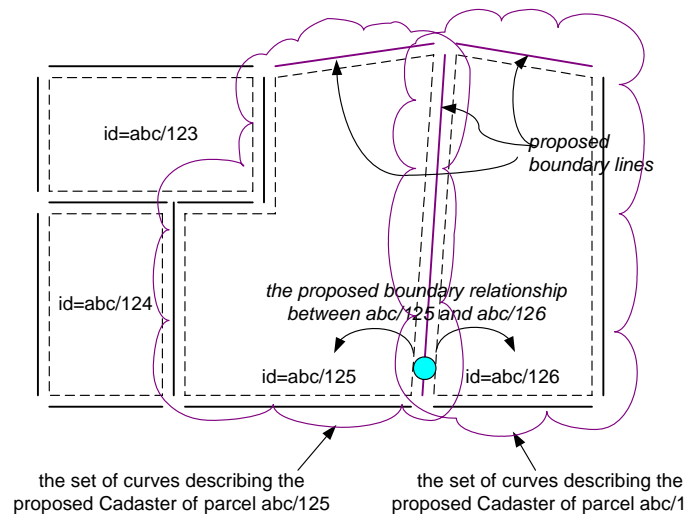


Figure 3: Propose/modify parcel boundary

Post Conditions

Property is created

Parcel boundary is initially created and relationships between parcels specified by boundary lines are asserted.

In the event of proposed modifications, both the current parcel boundary and the proposed parcel boundary exist with the same logical identity (LandTitleNumber) and relationships OR both the current and the proposed boundaries exist with the same logical identity (i.e. reference to the parcel being bounded)

Following acceptance of the parcel boundary, a single entity exists for the land parcel that defines the parcel and a single entity exists for the boundary around the parcel.

IFC Usage and Extension Requirements

Existing Entity/Class Usage

Entity Class Name	Usage
-------------------	-------

IfcConnectionGeometry	Defines the form of geometry at the connection. For spaces that are external generally, this will be specified by the subtype IfcConnectionCurveGeometry. However, the same concept may also be applied to a properties arranged vertically in which case the subtype IfcConnectionSurfaceGeometry would be more appropriate. The curve or surface selected may be the same as a curve specified in the cadaster.
IfcRelConnectsElements	Defines the interspatial relationship of two spatial structures either side of a curve that is a cadaster or shared boundary line.
IfcShapeRepresentation	RepresentationIdentifier value set to appropriate value as discussed above.
IfcSpace	Subtype of IfcSpatialStructureElement Defines an external space that has specific legal ownership considerations and that has a boundary whose position must be recorded. <i>NOTE: Land parcel space structures may not overlap each other. Boundaries between land parcels must be contiguous so that each curve forming the boundary is shared between two land parcels.</i>
IfcSpaceBoundary	Defines the boundary between two spaces that are land parcels

New Property Set Requirement

Name:	Pset_SpaceGeodeticLocation
Applicability:	IfcSpatialStructureElement entity.
Applicable Classes:	IfcSpace, IfcSite
Applicable Type Value:	
IFC Version:	2x3
Definition:	Definition from IAI: Identifies the geodetic location of a spatial structure in terms of its latitude, longitude and elevation. NOTE: To be used in preference to deprecated RefLatitude, RefLongitude and RefElevation attributes in IfcSite.

Property	Type	Datatype	Unit	Definition
RefLatitude	IfcPropertySingleValue	IfcCompoundPlaneAngleMeasure		World Latitude at Reference point (most likely defined in legal description). Defined as Real values for Degrees, minutes, seconds
RefLongitude	IfcPropertySingleValue	IfcCompoundPlaneAngleMeasure		World Longitude at Reference point (most likely defined in legal description). Defined as Real values for Degrees, minutes, seconds
RefElevation	IfcPropertySingleValue	IfcLengthMeasure		Datum elevation relative to sea level
MeasuredBy	IfcPropertySingleValue	IfcString		Identifies the means by which latitude, longitude and elevation are measured. May be used to identify e.g. GPS device and class.

Name:	Pset_SpaceReducedElevation
Applicability:	IfcSpatialStructureElement entity.
Applicable Classes:	IfcSpace, IfcSite
Applicable Type Value:	
IFC Version:	2x3
Definition:	Definition from IAI: Specifies the reduced elevation parameter that may be used for determining the potential pressure (head) for piped water systems.

<i>Property</i>	<i>Type</i>	<i>Datatype</i>	<i>Unit</i>	<i>Definition</i>
ReducedElevation	IfcPropertySingleValue	IfcLengthMeasure		Elevation to a reduced level datum that may be defined for local positioning.
ReducedElevationReference	IfcPropertySingleValue	IfcLabel		The place at which the reduced elevation is specified.

Issue List

<i>Question</i>	<i>Answer</i>
<p>IfcRelConnectsElements has a connection geometry that may be a connection curve geometry. Connection curve geometry identifies the relating curve and the related curve separately. Whilst they may be the same curve, this is not really the intent of the attributes.</p> <p>The approach ought to be more like IfcRelSpaceBoundary but this cannot be used since a spatial structure element is not a subtype of IfcElement.</p> <p>It might be more appropriate to define a new subtype of IfcRelConnects that can handle interspatial relationships directly (and as a logical and/or topological concept)</p>	<p>Use IfcRelConnectsSpatialStructureElements as a new entity that specifically handles the required connection relationship.</p>
<p>[TL 16.08.2004] PlanningStatus The proposal is to add an enum under the semantic object (here IfcLandParcel) to capture Proposed, Accepted, Rejected, Actual – in UC_define_construction_footprint a different solution was proposed (to deal with it by representation identifier) – it should be handled consistently</p>	<p>[TL 16.08.2004] a proposed answer would be to make the PlanningStatus a general enum for all products and add it more globally – if that is restricted by the platform stability, make it available via a property set for all subtypes of IfcProduct.</p>
<p>[TL 16.08.2004] Pset_GeodeticLocation – is it acceptable to constrain the latitude and longitude measure type to compound plane angle measure (or is there the need to be more general)</p>	