



# RICS IPMS Data Standard

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Version 1

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The RICS IPMS data standard is an XML schema allowing users to denote IPMS measurements of buildings and is compatible with RICS Property Measurement, 2nd edition.

The schema is extensible and flexible.

## Sample data file

A simple RICS IPMS measurement may look something like this:

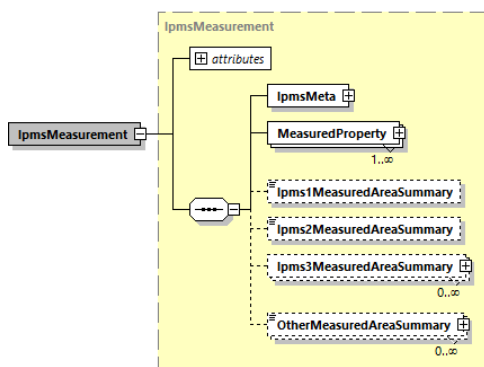
```
<?xml version="1.0" encoding="UTF-8"?>
<IpmsMeasurement xmlns="urn:rics:xsdschema:ipms:1.0"
xmlns:rics="urn:rics:xsdschema:commontypes:1.0"
xmlns:xal="urn:oasis:names:tc:ciq:xsdschema:xAL:2.0"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="urn:rics:xsdschema:ipms:1.0
file:///C:/Users/Documents/DataStandards/IPMS/rics-ipms-1.0.xsd">
  <IpmsMeta>
    <rics:Entity primaryUse="Office">
      <rics:Description>Acacia House</rics:Description>
      <xal:AddressDetails>
        <xal:AddressLines>
          <xal:AddressLine>1 Acacia Ave</xal:AddressLine>
        </xal:AddressLines>
      </xal:AddressDetails>
    </rics:Entity>
    <rics:PreparedFor>Acme House</rics:PreparedFor>

    <rics:Compliance>
      <rics:CertifiedBy>Susan Black MRICS</rics:CertifiedBy>
    </rics:Compliance>
    <rics:ReportDate>2017-06-28</rics:ReportDate>
    <rics:Methodology>Laser</rics:Methodology>
    <rics:UnitOfMeasure isPrimaryUnitMeasurement = "true">MTK</rics:UnitOfMeasure>
    <rics:UnitOfMeasure isPrimaryUnitMeasurement = "false" scaleFactor =
"10.7639">FTK</rics:UnitOfMeasure>
    <rics:MeasuredBy>Mary White (Hons) MRICS</rics:MeasuredBy>
    <rics:MeasuredBy>John Brown BSc (Hons)</rics:MeasuredBy>
    <rics:FloorPlan>
      <rics:File>
        <rics:ExternalFile
href="http://www.examplefloorplanstoredatabasefiles.info/ref1233.pdf" />
        </rics:File>
        <rics:CreatedDate>2016-01-04</rics:CreatedDate>
        <rics:Scale>1:50</rics:Scale>
        <rics:CreatedBy>Peter Pink</rics:CreatedBy>
      </rics:FloorPlan>
      <rics:MeasurementDate>2017-06-17</rics:MeasurementDate>
    </IpmsMeta>
    <MeasuredProperty>
      <rics:Floors>
        <rics:FloorLevel id="0" label="Ground Floor">
          <rics:Description>Office Space</rics:Description>
          <rics:Ipms3MeasuredFloorArea measurementSubtype="3">
            <rics:MeasurementValue>50</rics:MeasurementValue>
          </rics:Ipms3MeasuredFloorArea>
          <rics:MeasuredComponents>
            <rics:ComponentMeasurement uniclassCategory="Co_20_15_58" reference="0-1">
              <rics:Description>Office area</rics:Description>
              <rics:Ipms3MeasuredArea measurementSubtype="3">
                <rics:MeasurementValue>50</rics:MeasurementValue>
                <rics:Occupier>Acme Inc.</rics:Occupier>
              </rics:Ipms3MeasuredArea>
            </rics:ComponentMeasurement>
          </rics:MeasuredComponents>
        </rics:FloorLevel>
      </rics:Floors>
      <rics:Ipms1MeasuredArea>52</rics:Ipms1MeasuredArea>
    </MeasuredProperty>
    <Ipms1MeasuredAreaSummary>52</Ipms1MeasuredAreaSummary>
    <Ipms3MeasuredAreaSummary measurementSubtype="3">
      <rics:MeasurementValue>50</rics:MeasurementValue>
      <rics:Occupier>Acme Inc.</rics:Occupier>
    </Ipms3MeasuredAreaSummary>
  </IpmsMeasurement>
```

## Use of Enumerations

The IPMS data standard provides lists of known values for many attributes and elements where a list or set of data may be chosen from, for example, IPMS component area definitions. In this instance the enumeration, found in the enumeration schema, is defined by a type: *KnownIpmsComponentAreaEnum*. This enumeration contains the list of known component areas: “A”-“H” along with “B1”, “B2” and “B3”. These lists are useful for software developers but it should be noted that the schema allows for extensions of this data via the use of *IpmsComponentAreaType* which is defined as the superset of a string and *KnownIpmsComponentAreaType*, therefore technically allowing any string value. This pattern is followed throughout the data standard and serves to provide users of the standard with strong hints as to what values should be expected despite allowing freedom to submit any data.

## Overview



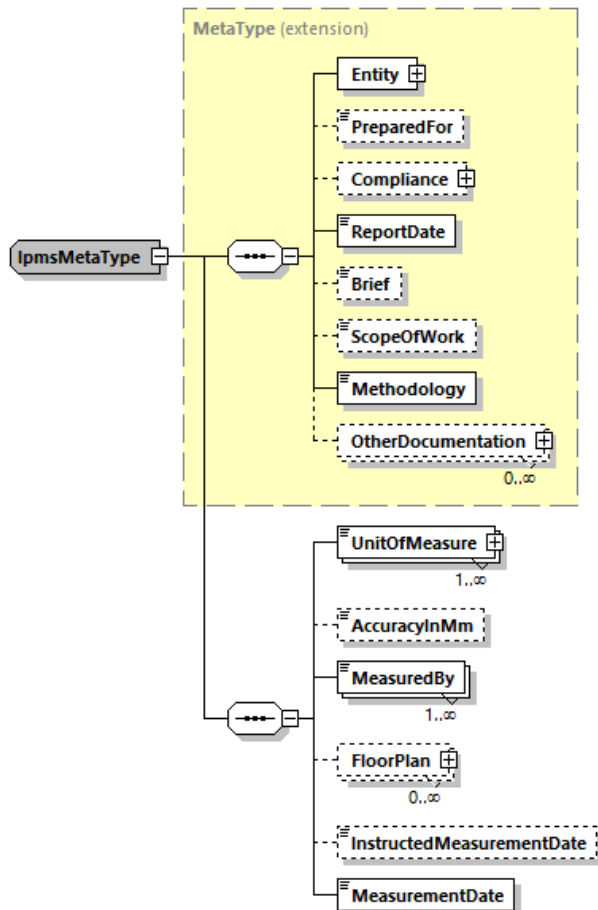
The XML schema comprises of a top-level element: *IpmsMeasurement*, which contains an *IpmsMeta* element, containing details about *Entity* being measured and the process of how it was measured. At its simplest this *Entity* is an address, which may represent multiple measured properties, a reference identifier and an optional attribute specifying the entity's *primaryUse* (generally one of either Office, Residential, Industrial, Retail or MixedUse). Addresses are specified using the OASIS xAL address specification – and can be specified with a high level of flexibility (see <http://www.oasis-open.org/committees/ciq>).

Further details contain information about who the measurement was *PreparedFor*, who took the measurement, *MeasuredBy*, the *InstructedMeasurementDate*, *MeasurementDate*, the date the report was written, the methodology of the measurement and the *UnitOfMeasure*. This *UnitOfMeasure* element must contain a unit of measure (taken from the standard 3 letter UN/CEFACT common codes). There may be multiple *UnitOfMeasure* elements if a report has a requirement to specify a measurement in multiple units. In the example above there is a secondary measure which details square feet and its respective scale factor. *UnitOfMeasure* measurement units are not constrained to the UN/CEFACT list (but should be used where available), and may be extended if required.

## Floor Plans

In addition, within the *IpmsMeta* element, there is an element that refers to the floor plans that may be available with additional details of the *Scale* used and *Description* of the plans along with files contained within the *File* element that contains the floor plans themselves. Files may also be identified by the *CreatedBy* element, which may reference the person or company that generated the file. These floor plans exist at the *IpmsMeta* level to avoid the need to separate plans that feature many properties, should the measurement comprise of multiple measurements.

An *AccuracyInMm* element optionally allows for a surveyor to specify how accurate (+/- in mm) the measurement has been taken. Permitted values have been derived from the RICS guidance note *Measured surveys of land, buildings and utilities (3rd edition, November 2014), section 2.3 Survey accuracy band table* (namely 5, 10, 25 or 50), but does allow for other values, should they be required.



## Compliance

There is a *Compliance* element within the *IpmsMeta* element that may contain details as to who certified the measurement. Additional elements available within the *Compliance* element are *ConflictsOfInterestNotes*, *ConfidentialityNotes*, *DigitalSignature*, *TermsOfUse*, *CertifiedBy* and the ability to add multiple files with the *SupportingDocumentation* element.

It should be noted that the *DigitalSignature* component of the standard allows for cryptographic signatures to be embedded within the standard to attest to the document's authenticity. Whilst there is no defined standard for how this element should be signed it is considered best practice to provide details on the signing process by the creator of the file, should this element be used.

The *StatementOfProfessionalism* element is used to document the firm or surveyor's stance in respect to the RICS Professional Statements around professionalism issued by the RICS. For example, *Conflicts of Interest* (see:

<http://www.rics.org/uk/knowledge/professional-guidance/professional-statements/conflicts-of-interest-global-1st-edition/>). The associated link attribute supports a URI to direct readers to a statement defining compliance.

## MeasuredProperty

Each *IpmsMeasurement* element may contain multiple *MeasuredProperties*. The purpose of this is to support measuring entities such as shopping centres which may contain more than one property to measure. Each *MeasuredProperty* element has a describing attribute for *primaryUse* and a *reference* which is used to link *FloorPlans* to (via its corresponding *measuredPropertyReference* attribute). Floor plans are not provided as elements at this element to prevent the requirement to split floor plans by building; the *measuredPropertyReference* is optional at the floor plan element level to provide the ability to provide a full set of floor plans at the *IpmsMeasurement* level and facilitate look-ups via the supplied reference.

*MeasuredProperty* elements specify containers for various measurements to be detailed. IPMS1, 2 and 3 measurements may be stored within the respective *IpmsMeasuredArea* element. Measurements that do not conform to the IPMS standard may also be stored at this level using multiple, optional, *OtherMeasuredArea* elements which should detail a *unitOfMeasure* and *description*.

## Floors

*Floors* are optional elements within the specification that support the breakdown of measurements by Floor Levels within a building. If included in the document, *Floors* must contain at least one *FloorLevel* element.

### Floor Levels

*FloorLevels* are identified by a combination of an identifier, *id*, which is to represent the floor number, i.e. “-1” for a basement, “0” for ground, “1” for the first floor, etc. and a *label* attribute, which can be used to give a local language identifier, i.e., “First floor”. Within the *Floor* element there is a *Description* (a description of the general use of the floor), the optional three IPMS measurements. Additional miscellaneous measurements are also allowed, using the *OtherMeasuredFloorArea* element.

Each floor level may optionally include elements that define the component areas within a given floor. Building components are identified by a *uniclassCategory* attribute, and optionally a *reference* that can be used for other purposes.

### Components

*Components* are identified by a *description*, measurements (IPMS 2, 3 or ‘other’), an optional list of occupiers and a reference that may be used for other purposes. Components have a *componentAreaType* (“A”-“H”) attribute and may optionally be identified by a *uniclassCategory* attribute which is taken from the UniClass 2015 spaces and areas list (see <https://toolkit.thenbs.com/articles/classification#classificationtables>). Components may be specified as being of limited use through the Boolean attribute *isLimitedUse* and detailing the type of limited use of the component within one or many *LimitedUse* elements. Limited Use areas are one of the following:

- AreaDifferenceFromInternalDominantFace
- AreaDifferenceFromCoveredArea
- AreaWithLimitedHeight
- AreaWithLimitedLight
- AboveGround
- BelowGround
- InternalStructureWallsColumns;

Each of the Limited Use areas may be further defined through the *category* attribute. Finally, there are measurement data elements available for each component: an *Ipms2MeasurementArea* and *Ipms3MeasurementArea* recorded. Other measurements are also specifiable.

Use of the *isExcluded* attribute of a component should distinguish between the states of inclusion of floor components, although by default this attribute is “false”, but facilitates the ability to “include” and “exclude” measurements, as discussed in the IPMS standard.

### Final measurements

Each *IpmsMeasurement* top level element should contain one of more summary measurements. These measurements may be specified as an IPMS 1, 2 or 3 measurement. The *IpmsMeasurement* element may include other summary measurements as well, for example, the requestor may request a measurement given in a locally defined standard. Other measurements types are specified, as all other measurement types are, by the primary measurement unit specified in the *UnitOfMeasure* element within the *IpmsMeta* element and should, but are not required to, contain a description of the measurement type within its *description* attribute.

IPMS 1 and 2 measurement elements are simple decimal values. For example:

```
<Ipms1MeasuredAreaSummary>
  44.5
</Ipms1MeasuredAreaSummary>
```

*Ipms3MeasuredAreaSummary* along with other IPMS 3 measurement elements contain three additional attributes: *measurementSubtype*, *isPrivate* and *isShared*. The measurement sub-type is a choice of IPMS 3 measurements – and is either 3, 3A, 3B or 3C although the schema does allow for extensions, should additional measurement types be published. The *occupier* element allows for measurements to be presented on an occupier-by-occupier basis. For example:

```
<Ipms3MeasuredAreaSummary measurementSubtype = "3A" isPrivate = "true" isShared = "false">
  <MeasurementValue>
    1201.8
  </MeasurementValue>
  <Occupier>
    ACME Inc.
  </Occupier>
</Ipms3MeasuredAreaSummary>
```

Summarised elements should be totals based on the total respective included component area measurements (or the total measurements documented at the *MeasuredProperty* level).

## Files referenced

Within the specification there is the ability to refer to files. These files may be text, PDF files or proprietary binary files. Files may be referenced as internal files or external files. *InternalFiles* contain an element which should be mime-encoded, in addition to attributes detailing its format and description. Other attributes allowing for extensibility here are allowed, too.

External files may be referenced by a URI and include a *description* attribute.

## Address types

With the use of the OASIS XML address specification (xAL) it is possible to define property addresses very precisely. The following examples, taken from the Oasis website, are valid xAL representations:

```
Level 12, 67 Albert Avenue  
Chatswood  
NSW 2067  
Australia
```

```
<AddressDetails>  
<AddressLines>  
<AddressLine>Level 12, 67 Albert Avenue</AddressLine>  
<AddressLine>Chatswood</AddressLine>  
<AddressLine>NSW 2209</AddressLine>  
<AddressLine>Australia</AddressLine>  
</AddressLines>  
</AddressDetails>
```

```
Level 12, 67 Albert Avenue, Chatswood, NSW 2067  
PO Box: 773, Chatswood, NSW 2057  
Australia
```

```
<AddressDetails AddressType="Primary and Residential">  
<Country>  
<CountryName>Australia</CountryName>  
<AdministrativeArea>  
<AdministrativeAreaName>NSW</AdministrativeAreaName>  
<Locality>  
<LocalityName>Chatswood</LocalityName>  
<Thoroughfare Type="Street">  
<ThoroughfareNumber>67</ThoroughfareNumber>  
<ThoroughfareName>Archer Street</ThoroughfareName>  
<Premise Type="Building">  
<BuildingName>Egis</BuildingName>  
<SubPremise Type="LEVEL">  
<SubPremiseNumber>12</SubPremiseNumber>  
</SubPremise>  
</Premise>  
</Thoroughfare>  
<PostalCode>  
<PostalCodeNumber>2067</PostalCodeNumber>  
</PostalCode>  
</Locality>  
</AdministrativeArea>  
</Country>  
</AddressDetails>
```

```
Chatswood Grove, Block A, Level 2, Suite 1A, 12-14 Malvern Avenue,  
Adjacent to Chatswood Chase, Chatswood, NSW 2067, Australia
```

```
<AddressDetails>  
<Country>  
<CountryName>Australia</CountryName>  
<AdministrativeArea>  
<AdministrativeAreaName>NSW</AdministrativeAreaName>  
<Locality>  
<LocalityName>Chatswood</LocalityName>  
<Thoroughfare>  
<ThoroughfareNumberRange Type="EVEN">  
<ThoroughfareNumberFrom>  
<ThoroughfareNumber>12</ThoroughfareNumber>  
</ThoroughfareNumberFrom>  
<ThoroughfareNumberTo>  
<ThoroughfareNumber>14</ThoroughfareNumber>  
</ThoroughfareNumberTo>  
</ThoroughfareNumberRange>  
<ThoroughfareName>Malvern</ThoroughfareName>  
<ThoroughfareTrailingType>Avenue</ThoroughfareTrailingType>  
<Premise Type="Building">  
<BuildingName>CHASTWOOD GROVE</BuildingName>  
<SubPremise Type="BLOCK">  
<SubPremiseNumber>A</SubPremiseNumber>  
<SubPremise Type="LEVEL">  
<SubPremiseNumber>2</SubPremiseNumber>  
<SubPremise Type="SUITE">  
<SubPremiseNumber>1</SubPremiseNumber>  
<SubPremiseNumberSuffix>A</SubPremiseNumberSuffix>
```

```
</SubPremise>
  </SubPremise>
</SubPremise>
  <Premise Type="SHOPPING CENTRE" PremiseDependency="PREMISE"
PremiseDependencyType="ADJACENT TO">
  <PremiseName>Chatswood Grove</PremiseName>
  </Premise>
  </Premise>
</Thoroughfare>
<PostalCode>
  <PostalCodeNumber>2067</PostalCodeNumber>
</PostalCode>
</Locality>
</AdministrativeArea>
</Country>
</AddressDetails>
```



## Self-documenting schema

The schema contains multiple annotations, currently just in English, taken from the Professional Statement that document the use of various elements that are defined in the schema. For example:

```
<xs:attribute name="limitedUse" type="LimitedUseDescriptionType" default="None">  
<xs:annotation>  
  <xs:documentation xml:lang="en">
```

In certain markets there may be areas in buildings that are incapable of occupation in the light of government regulation or labour legislation. Such areas and their limitations are to be identified, measured and stated separately within IPMS reported areas. Users and Third Parties need to be aware that the inclusion of measured areas in IPMS does not mean the areas are available for legal occupation or use.

```
</xs:documentation>  
</xs:annotation>  
</xs:attribute>
```

This documentation may be automatically extracted and presented in software applications and online documentation tools that utilise the schema.

## Full Schema

The schema is separated into three files. The enumerations, effectively lists of values; types where the types referenced in the IPMS data standard are defined and the IPMS xml standard itself. The documentation of the schema is available in separate HTML files which were generated using xsddoc (<http://xframe.sourceforge.net/xsddoc/>).

It is expected that the types and enumeration xml schemas will be updated regularly to incorporate new RICS data standards. Every effort will be made to ensure the schemas remain backwardly compatible.