



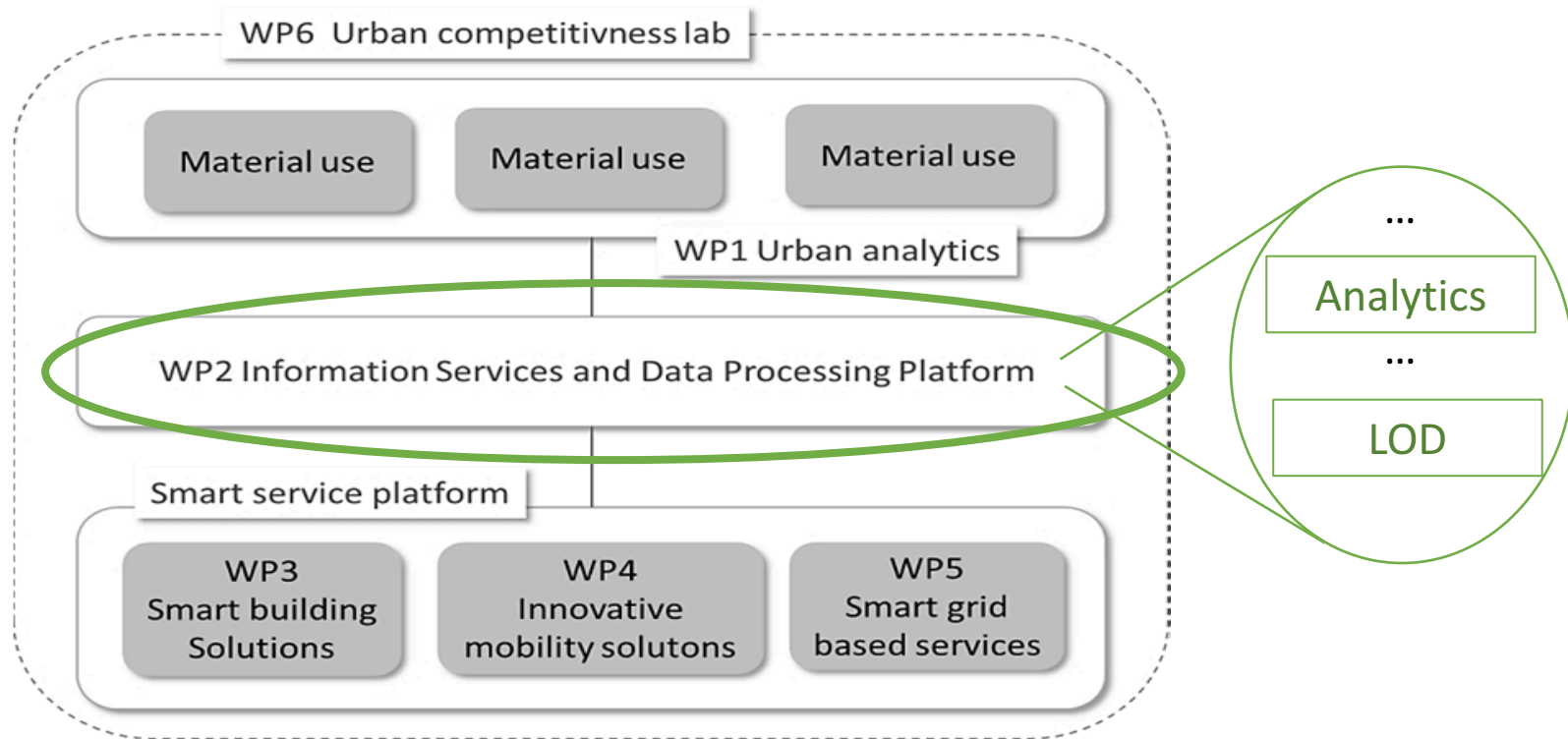
Metadata for the Energy Performance Certificates of Buildings in Smart cities

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International Conference on Dublin Core and
Metadata Applications

The SusCity Project





Adapted from Aelenei et al. (2016)



Environmental Scan (Curado Malta & Baptista, 2013):

- Research study done by students in the 2nd semester of 2015/2016
- **Scope:** Energy Performance & LOD - standards, metadata schemas, vocabularies and datasets on Energy Performance of buildings
- **Where:** Open data portals of London, Paris and Amsterdam (and more)
- **To:** find MAPs, metadata elements & encoding schemes used for EPCs.

Results: specific datasets encoded in RDF, but none with the specific information we needed.

Scope: Energy Performance Certificates (headers).

Partner: ADENE (Agência para a Energia)

- 1 Metadata Application Profile
- 1 Metadata Schema
- 4 Controlled Vocabularies encoded in SKOS:
 - EPC Types
 - EPC Types of Buildings
 - Energy Labels
 - Measures for Energy Performance

Two kinds of data:

- Sent by the partners
- Generated by the internal analytics module

Privacy and security issues

EPC:

only some data is released

we added some data (e.g., Country)

Online at <http://www.adene.pt/sce/micro/certificados-energeticos>

TIPO DE DOCUMENTO

Todos



TIPO DE EDIFÍCIO OU FRACÇÃO

Todos



IDENTIFICAÇÃO DO IMÓVEL

Morada



Distrito

Todos



Concelho

Escolha um distrito



Freguesia

Escolha um concelho



Conservatória do Registo Predial

Sob o nº

Artigo Matricial nº

Fração Autónoma

CERTIFICADO

Nº de Documento

Pesquisar

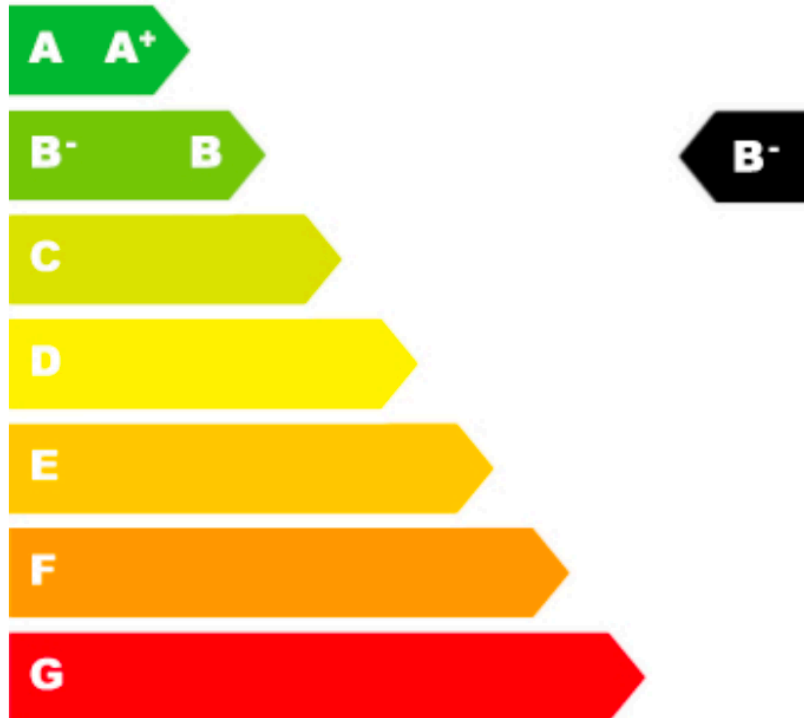


DOCUMENTO Nº: DCR0000002306516  

Certificado de Desempenho Energético

ETIQUETA DE DESEMPENHO ENERGÉTICO

Classe energética



TIPO DE DOCUMENTO:

Declaração de Conformidade Regulamentar

 Private Information

Valado, Póvoa Vale do Trigo

LOCALIDADE:

Póvoa Vale do Trigo

FREGUESIA:

Aguada De Cima

CONCELHO:

Agueda

DATA DE EMISSÃO:

11-11-2008

DATA DE VALIDADE:

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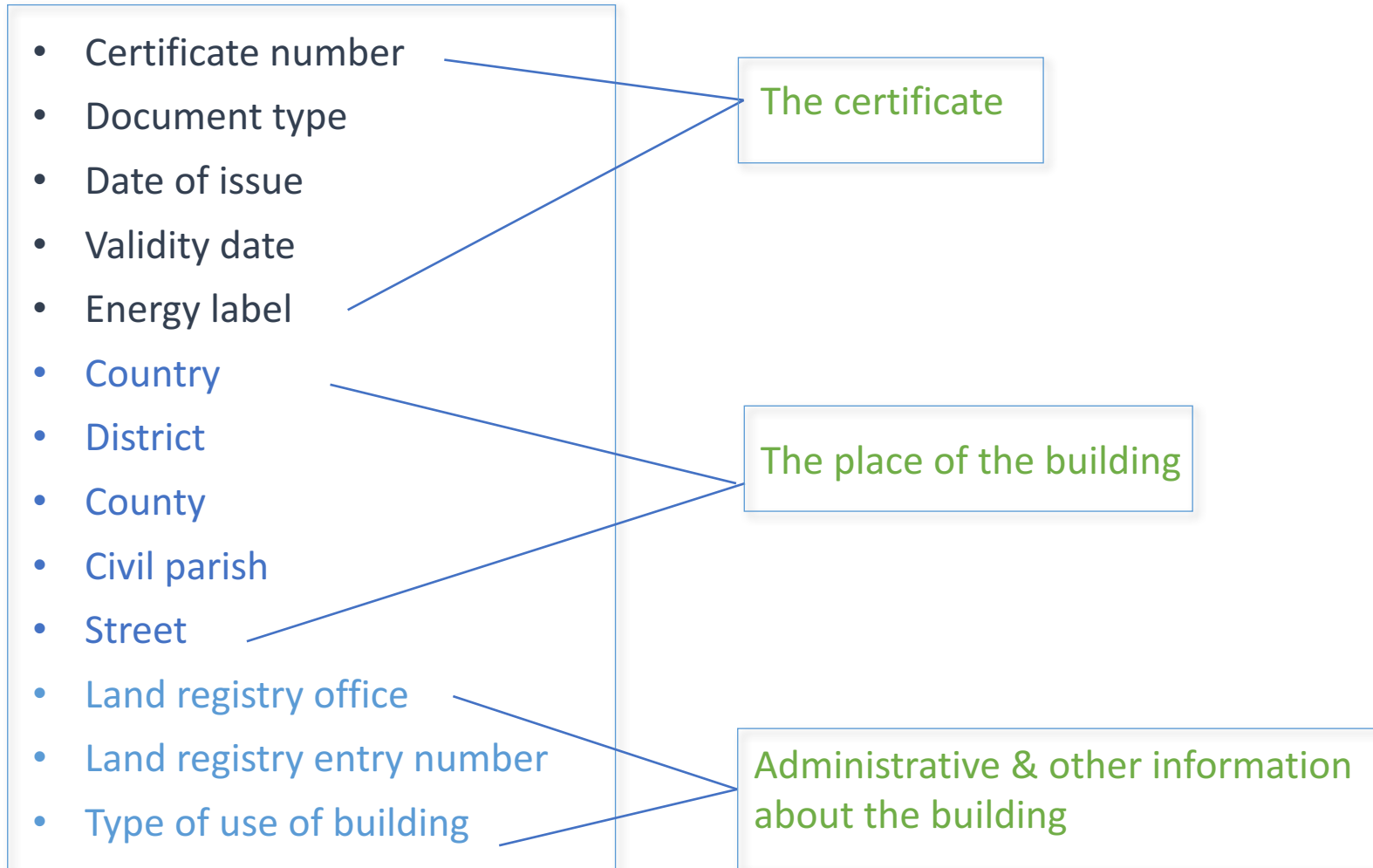
NOME DO PERITO QUALIFICADO:

Mário Miguel Marques Mendes

Nº DO PERITO QUALIFICADO:

PQ00424

Imóvel descrito na 1ª Conservatória do Registo Predial de **Águeda** sob o nº **5427** Art. matricial nº **R-7880** Fracção autónoma

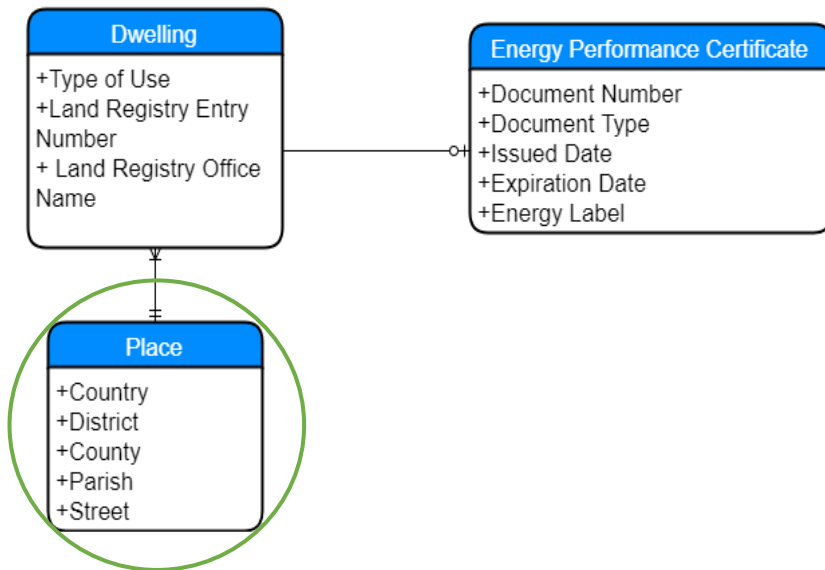


- Look for properties that would match the attributes identified in the domain model
 - Searches using LOV (and more)
 - Underlying decisions:
 - To respect the semantics in the description of the property;
 - To respect the property's domain and range (not always possible)
-
- How we chose the properties:
 1. Properties in standards/recommendations
 2. Properties in widely used vocabularies
 3. Properties in vocabularies used 2 or more times
 4. New property created by us

- Sometimes we have to give away something
- These are not easy decisions and so they are subject to controversy

Example1: `dbo: parish; rdfs:domain dbo:PopulatedPlace`

Example2: `vcard: country-name; rdfs:range xsd:string`



`rdfs:domain`

`EnergyPerformanceCertificate`

OR

a wider domain

OR

left unspecified

- Creation of terms in **wikidata**; **no constraints**
- **Structure** is given in the RFDS or SKOS files
- Domain and range of the new properties are left **unspecified**
- Relation through `owl:sameAs` `owl:equivalentClass` and `owl:equivalentProperty` properties

Constraints matrix (Curado Malta & Baptista, 2013; Coyle & Baker, 2009) with many adaptations:

Attribute original name

Label

Namespace

Namespace prefix

Property name

Description

Original domain

Original range

Domain in the MAP

Range in the MAP

Cardinality

- Only one class: the `EnergyPerformanceCertificate`
- Four new properties (domains and ranges left unspecified)
- Four new controlled vocabularies

Attribute original name	Label	Namespace	Namespace prefix	Property name
Nº de documento (certificado)	Document number	http://dbpedia.org/ontology/	dbpedia-owl	documentNumber
Tipo de documento	Document type	http://purl.org/dc/terms/	dct	type
Data de emissão	Date of Issuance	http://purl.org/dc/terms/	dct	issued
Data de validade	Date of Validity	http://purl.org/dc/terms/	dct	valid
Classe energética	Energy Label	http://opendata.dsi.uminho.pt/terms/energy/energyCertificates.rdf#	ec	energyLabel
País	Country	http://www.w3.org/2006/vcard/ns#	vcard	hasCountryName
Distrito	District	http://data.ordnancesurvey.co.uk/ontology/admingeo/	osadm	district
Concelho	County	http://data.ordnancesurvey.co.uk/ontology/admingeo/	osadm	county
Freguesia	Parish	http://data.ordnancesurvey.co.uk/ontology/admingeo/	osadm	parish
Rua	Street	http://www.w3.org/2006/vcard/ns#	vcard	street-address
Conservatória do Registo Predial	Land Registry Office	http://opendata.dsi.uminho.pt/terms/energy/energyCertificates.rdf#	ec	landRegistryOffice
Artigo matricial nº	Land Registry Number	http://opendata.dsi.uminho.pt/terms/energy/energyCertificates.rdf#	ec	landRegistryNumber
Tipo de uso do edifício ou fracção	Type of use of building	http://opendata.dsi.uminho.pt/terms/energy/energyCertificates.rdf#	ec	useOfBuilding

Namespace prefix	Property name	Original domain	Original range	Domain in the MAP	Range in the MAP	Cardinality
dbpedia-owl	documentNumber	dbo:Document	xsd:string	ec:EnergyPerformanceCertificate	xsd:string	1
dct	type	Unspecified	rdfs:Class	ec:EnergyPerformanceCertificate	string, EPC Types vocabulary (http://opendata.dsi.uminho.pt/terms/energy/EPCTypes.skos)	1-2
dct	issued	Unspecified	rdfs:Literal	ec:EnergyPerformanceCertificate	xsd:date	1
dct	valid	Unspecified	rdfs:Literal	ec:EnergyPerformanceCertificate	xsd:date	1
ec	energyLabel	Unspecified	Unspecified	ec:EnergyPerformanceCertificate	xsd:string + Energy Labels vocabulary (http://opendata.dsi.uminho.pt/terms/energy/energyLabels.skos)	1
vcard	country-name	Unspecified	xsd:string	ec:EnergyPerformanceCertificate	xsd:string, TGN, GeoNames	1-3
osadm	district	Unspecified	osadm:District & others	ec:EnergyPerformanceCertificate	xsd:string, TGN, GeoNames	1-3
osadm	county	Unspecified	osadm:County & others	ec:EnergyPerformanceCertificate	xsd:string, TGN, GeoNames	1-3
osadm	parish	Unspecified	osadm:CivilParish & Others	ec:EnergyPerformanceCertificate	xsd:string, TGN, GeoNames	1-3
vcard	street-address	Unspecified	xsd:string	ec:EnergyPerformanceCertificate	xsd:string	1
ec	landRegistryOffice	Unspecified	Unspecified	ec:EnergyPerformanceCertificate	xsd:string, New controlled vocabulary to be encoded in SKOS	1-2
ec	landRegistryNumber	Unspecified	Unspecified	ec:EnergyPerformanceCertificate	xsd:string	1
ec	useOfBuilding	Unspecified	Unspecified	ec:EnergyPerformanceCertificate	xsd:string, EPC Types of Buildings vocabulary (http://opendata.dsi.uminho.pt/terms/energy/EPCTypesOfBuildings.skos)	1-2

Measures for Energy Performance vocabulary (23 terms)

EPC Types vocabulary:

- Regulatory Compliance Statement

- Energy Certificate

EPC Types of Buildings vocabulary:

- Domestic

- Non-domestic

 - small commercial and service buildings

 - large small commercial and service buildings

Energy Labels vocabulary:



- This is a simple project; larger projects face more challenges
- In many cases we face colliding options
- Decisions are not easy and are subject to controversy but need to be discussed
- Often the question is: what can we afford to give away?

- Aelenei, L., Ferreira, A., Monteiro, C. S., Gomes, R., Gonçalves, H., Camelo, S., & Silva, C. (2016). Smart City: A Systematic Approach towards a Sustainable Urban Transformation. *Proceedings of the 4th International Conference on Solar Heating and Cooling for Buildings and Industry (SHC 2015)*, 91(Supplement C), 970–979. <https://doi.org/10.1016/j.egypro.2016.06.264>
- Coyle, K., & Baker, T. (2009, May 18). Guidelines for Dublin Core Application Profiles. Retrieved 28 June 2010, from <http://dublincore.org/documents/2009/05/18/profile-guidelines/>
- Curado Malta, M., & Baptista, A. A. (2013). A Method for the Development of Dublin Core Application Profiles (Me4DCAP V0.2): detailed description. In K. Eckert & M. Foulonneau (Eds.) (pp. 90–103). Lisbon, Portugal: Dublin Core Metadata Initiative. Retrieved from <http://dcevents.dublincore.org/IntConf/dc-2013/paper/view/178/81>

Thank you.

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