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THE ROLE OF VOLUNTEERED GEOGRAPHIC INFORMATION TOWARDS 3D CADASTRAL SYSTEMS

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Motivation

- General mapping – particularly cadastral mapping – is highly expensive.
- 3D cadastre represents an added issue as it possibly requires even more detailed geospatial data.
- Practical acquisition of geospatial data in the field is a complex and laborious task.
- Although property cadastre is acknowledged to be fundamental in an healthy economy, governmental authorities are less and less willing to continue covering the even increasing costs of surveys in the field.

Motivation

- Volunteered geographic information (VGI)
  - Can VGI actually contribute towards property cadastre to tackle those issues?
  - To what extent?
  - Is actually possible that cadastral data can be acquired in the field by citizens… “non-qualified” people?
- It is believed that VIG can be considered an interim step until full 3D surveyed cadastre is achieved.

Motivation

- VGI is a wide research topic. Key questions – like reputation, trust, quality – are object of current debate and are still open.
- VGI may have not proved yet to be an appropriate source to contribute to fundamental nationwide spatial data infrastructures (SDE), such as 3D cadastral systems.
- Even so, there are in fact some arguments to believe that VGI might be a sound source of geographic data.
- Therefore, VGI should not be seen as a threat but as a potential opportunity for mapping agencies in all domains, including property cadastre.

Main goal and objectives

- Purpose of our paper in this workshop is manly exploratory.
- Work presented in here aims:
  - To identify a specific situation where VGI can in fact be considered.
  - To find out how it can be used in practical terms.

VGI *versus* SDI

- Some authors (*e.g.* Genovese and Roche 2010, Gould 2008)[1] have recognised that the integration of VGI into agency-developed SDI seems to be technically awkward
  - VGI "bottom-up" approach,
  - SDI "top-down" approach.
- VGI deals with large scale geospatial data relating to more specific fields of interest
  - Thus, local level SDI appear to be easier to integrate VGI.
- In turn, different local SDI could be connected together and used then to build upon a top level SDI.

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1 GENOVESE, E.; ROCHE, S. (2010): Potential of VGI as a Resource for SDIs in the North/South Context. Geomatica, Vol. 64, No. 4, pp. 439-450.

GOULD, M. (2008): GI field looking the wrong way – again? GEOconnection International Magazine, dec07/jan08, pp.19-20

Our own context (i)

- Coimbra district (Portugal) is one of those not under full cadastral law regime for official surveyed cadastre has not been undertaken yet
  - **Land Registry Office**: “Registo Predial” database -> legal purposes
    - Title registration,
    - Ownerships rights,
    - Textual description of property unit.
    - …
  - **Inland Revenue Office**: “Matriz Predial” database -> taxation purposes
    - Tax payer (not necessarily the actual owner),
    - General text-based description of property unit,
    - Valuation attributes -> formula -> council tax
    - …

Our own context (ii)

- However, local city council is in possession of a considerable amount of geometry data (*e.g* development plans…)
  - Although not compliant with the national cadastral standard (data not provided by national cadastral agency), indeed most useful source information for municipal land management purposes,
  - For their own internal purposes, a framework on different sources of cadastral data was set up
    - Hierarchical validation procedure in terms of 3D cadastre,
    - To classify and to assign each cadastral dataset to a specific validity level,
    - Metadata
- Opportunity for VGI to considered…?

A five-validity level hierarchy of cadastral data

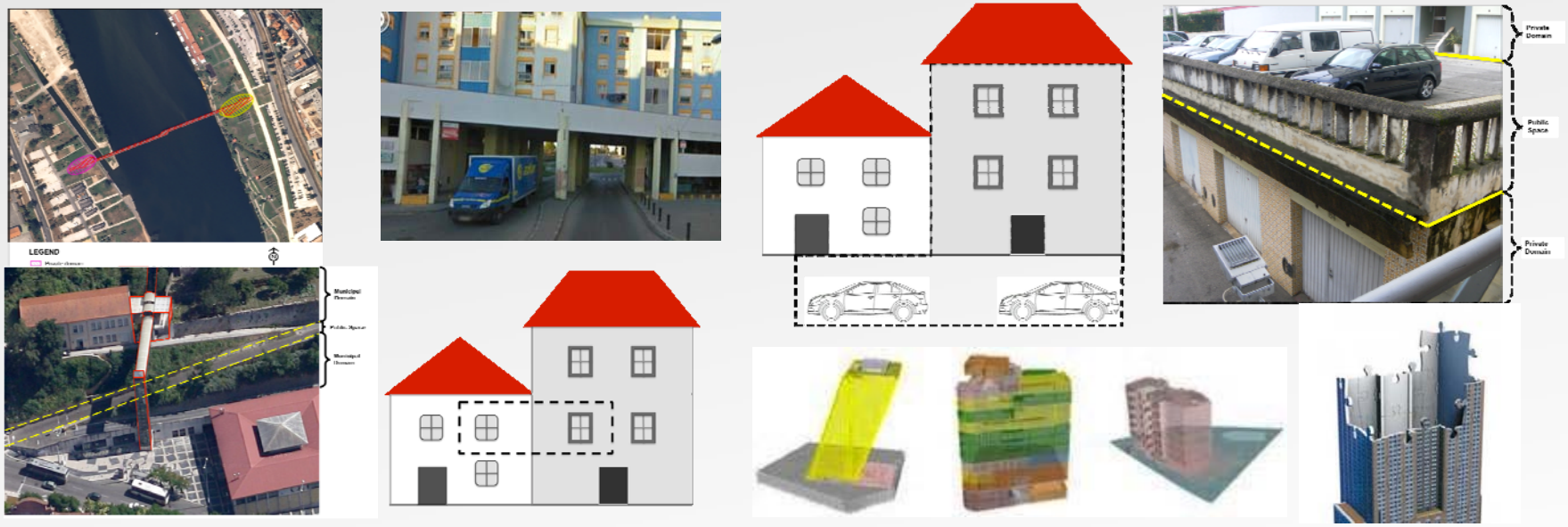
Coimbra City Council's framework (2D data)	Framework hereby proposed (3D data)
Nível 5 – Inventário cadastral definitivo: informação proveniente de processos onde conste levantamento topográfico vectorial, registo no Registo Predial ou Matriz Predial, e Declarações de Titularidade (caso não sejam prédios do Município de Coimbra) e verificação *in situ* da área.	**Level 5** – Full 3D survey promoted by the national cadastral authority.
Nível 4 – Inventário cadastral provisório: informação proveniente de processos onde conste levantamento topográfico em formato vectorial, registo no Registo Predial ou Matriz Predial. *E.g.* inventário cadastral promovido pela CMC, informações de dominialidade, processos urbanísticos, processos de expropriação, certidões de divisão de prédio, etc.	**Level 4** – 3D survey undertaken by non-official cadastral entities (either private or public).
Nível 3 – Informação cadastral proveniente de processos nos quais conste levantamento topográfico do prédio em formato analógico.	**Level 3** – Private initiatives (including developers' project plans).
Nível 2 – Informação proveniente de processos promovidos por particulares/CMC (sem levantamento topográfico associado, mas onde conste peça desenhada com o polígono correspondente ao prédio delimitado de algum modo).	**Level 2** – Volunteered geographic information (VGI).
Nível 1 – Informação proveniente de processos - denúncias, queixas, reclamações, etc. - onde o prédio seja indicado por uma mancha ou ponto sem delimitação do prédio, *e.g.* pedido de limpeza de um terreno.	**Level 1** – 3D data mining-based inference from, for instance, postal address databases.

Local level SDI on 3D cadastre

- This may well be the basis for the implementation of a local spatial data infrastructure on 3D cadastre.
- Although local city councils are not part of the national cadastral authority, by designing such a system Coimbra City Council aims:
  - To implement a local SDI useful for their own purposes mainly dealing with land management;
  - To constitute a case study.
- It is strongly believed that the success of the system will depend to a great extent on the consideration of VGI – especially in the early stages of the development process.
  - *E.g.* in identifying some complex 3D cadastre cases.

Future work:
Design of a web-based application

- To locate users' properties on a 2D index map.
- To upload 3D coordinates of virtual (or existing) landmarks shaping a given property's polygon.
- To identify whether users' properties happen to match any of the complex 3D cadastre prototypes (identified elsewhere as part of our research)



- Functionalities may include interactive 3D visualisation – enabling both internal and external exploration in some detail.