

“A FIRST ATTEMPT FOR USING VOLUNTEERED GEOGRAPHIC INFORMATION AND CROWD SOURCING TECHNIQUES IN CADASTRE”

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FIG COMMISSION 3 WORKSHOP

“The Empowerment of Local Authorities: Spatial Information and Spatial Planning Tools.”
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INTRODUCTION

The aim of the specific research is to incorporate the ***Volunteered Geographic Information*** in ***Cadastre*** by using crowd sourcing methods.

On the one hand

Volunteered Geographic Information: “the digital spatial data which is collected and edited not by data producers but by citizens who are not experts but willing to disseminate their spatial knowledge and observations”.

On the other hand

Cadastre is an essential tool for land management and administration as it records the land parcels which constitute a part of a country’s spatial information infrastructure.

INTRODUCTION

Three fundamental questions when research began...

- Can the VGI be incorporated in Cadastre and in which extend?
- What make citizens participate in mapping projects?
- Would they be willing to participate in cadastral mapping as an alternative way to speed up the cadastral survey?

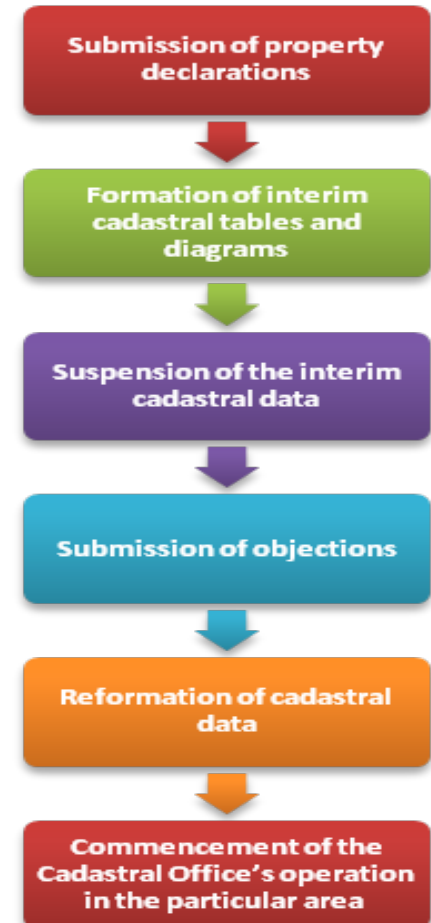
Previous research over the topic...

- Evaluation of the VGI accuracy (Haklay, Ather, Kounadi et.c)
- Estimation of the number of volunteers who can eliminate the errors (Haklay, 2010)
- Incorporation of VGI in a flexible cadastral system in a theoretical framework (Laarakker, 2011)

How Cadastral Survey Practices work in Greece? The Hellenic Cadastre

The AAA Cadastre in Greece:

- Declarations are submitted to the Cadastral Offices.
- The interim cadastral tables and diagrams are formed based on the data that has been collected from the submitted declarations.
- The interim cadastral data is suspended at the Cadastral Survey Offices for a two-month period.
- Objections or applications for correction of a cadastral registration are submitted.
- The cadastral data is reformed.
- The Cadastral Office is in operation in the particular area replacing the old Land Registry Office.



PRACTICAL APPLICATION

The Area of Interest



Tsoukalades village is located in 220 meters elevation in the north-west part of the island of Lefkada and it has 431 habitants.

Lefkada island

Lefkada island belongs to the Ionian islands complex covering an area of 302.5 square kilometers with a population of 23.000 people.

PRACTICAL APPLICATION

The Cadastral Units



Cadastral survey produced by the contractor (in red)
cadastral survey produced by KT (in green)

Two cadastral units in a rural area on a Greek island that have suffered long and multiple failures of the traditional procedures.

Cadastral surveys are still uncompleted due to errors and discrepancies

Under cadastral survey for more than 12 years.

The first field survey was implemented by a private contractor.

The second effort has been implemented by the qualified staff of the mapping agency.

The new cadastral maps and records are related to those provided by the contractor.

PRACTICAL APPLICATION

The Cadastral Units

After the re-survey of the two cadastral units six error categories are identified on the cadastral survey:

- Land parcels which have been redefined into the same cadastral unit after the boundaries or location correction.
- Land parcels which although they were declared by the owners within the declaration period they were not recorded by the contractor in the interim cadastral plans.
- Land parcels which were registered into the interim cadastral plans by the contractor as belonging to wrong cadastral units but after the re-survey it was found that they should be relocated within the specific cadastral units.
- Land parcels which had to be removed from the specific cadastral units as after the re-survey it was discovered that they belong to other units.
- Land parcels that were not registered into the cadastral records at all.
- Land parcels which are located in adjacent cadastral units and are affected geometrically due to the corrections.

PRACTICAL APPLICATION

The Practical Experiment

- Cadastral Unit: 340370914
- A weekend experiment
- 15 volunteers
- 19 parcels
- 3 experts
- 1 handheld GPS



PRACTICAL APPLICATION

The Practical Experiment

Strengths of the experiment:

- Noticeable Participation
- Willingness to answer sensitive personal information
- No boundary disputes among the owners

Weaknesses of the experiment:

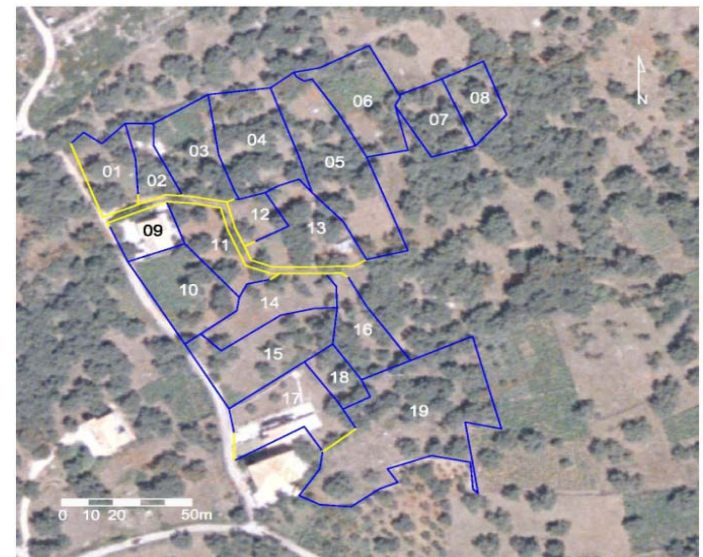
- Accessibility was limited due to cultivated crofts.
- The GPS signal was obstructed.
- Some elder volunteers provided with a handheld GPS were not familiar with new technologies preferring keeping a supervising role.



PRACTICAL APPLICATION

The Results

- Editing of tracks & creation of cadastral extracts was done by the researchers aftermath at the laboratory.
- Overlay of the cadastral map on the LSO orthophotomap:
 - 1) as it is derived from the field measurements made by the land owners, without any correction or adjustment.
 - 2) adjustment of the obvious errors; the new boundary lines are marked in yellow.

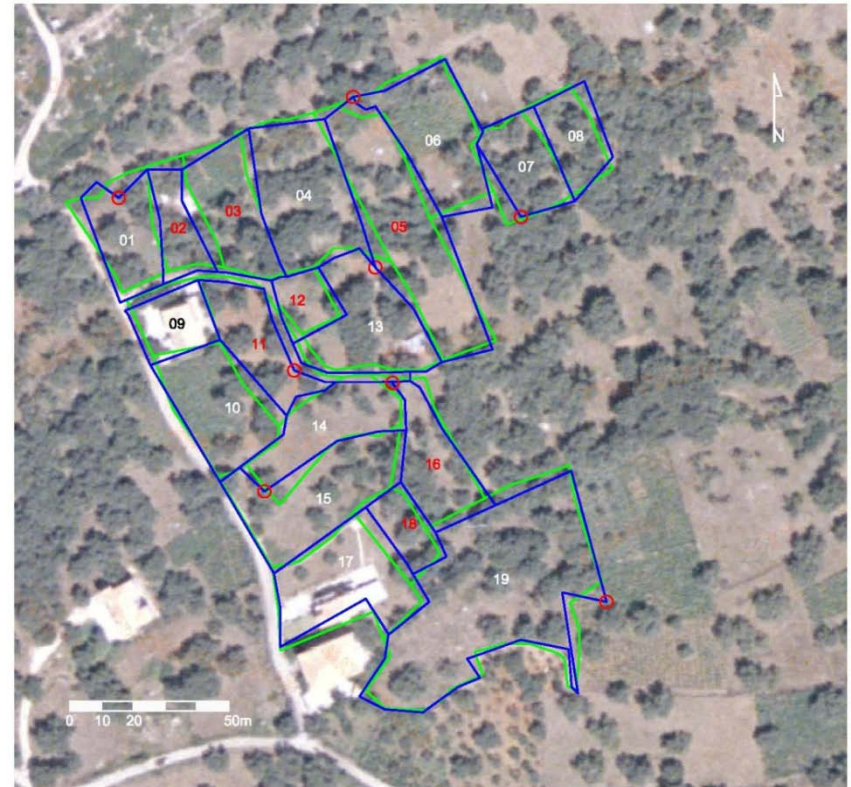


PRACTICAL APPLICATION

The Results

The comparison between the official and the measurements provided by the volunteers showed some discrepancies at the boundary nodes and the boundary lines of the parcels:

- eight of the hundred measured nodes have coordinate deviations greater than 5m.
- the area size of seven out of the nineteen land parcels (37%) differs from the correct size.



However, the location and shape of all land parcels are correctly defined and the majority of the land parcels' area size is sufficiently defined (within the requirements).

PRACTICAL APPLICATION

The Interviews - the Odyssey of their Property Registration

The first cadastral map version:

- Defining the boundaries of land parcels on LSO 1:5000 orthophotos

The second cadastral map version:

- A re-survey in the field by the contractor with the aid of a handheld GPS.

The third cadastral map version:

- The area was surveyed with the aid of total stations and GPS by a new private contractor in only some scattered areas within the greater area.

The fourth cadastral map version:

- fully re-survey of the two cadastral units by the mapping agency.



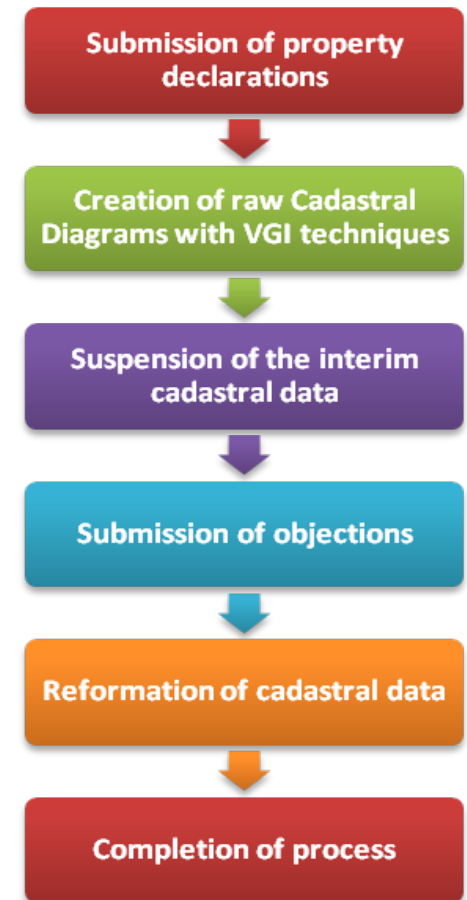
The major problems:

- The cost of the whole cadastral survey process.
- The long duration time of the whole process
- For more than 12 years the owners are unable to transfer their properties although they are obliged to pay all property taxes.

CONCLUSIONS

Conclusions...

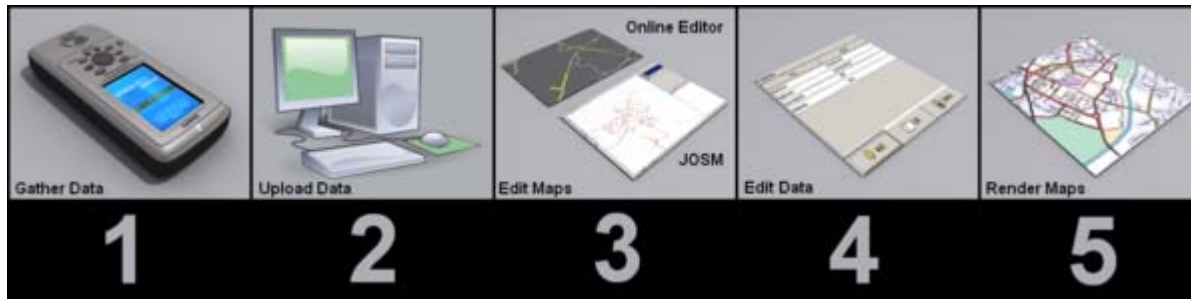
- Owners are willing to participate.
- No gross errors in the location of parcels detected during this experiment. 2/3 of parcels within the official requirements.
- Identification of the parcels on orthophotos at the cadastral office seems to be difficult and confusing.
- Easy & Cheap for the owners to collect raw measurements on the field by themselves.
- *The first practical approach was positive although a more detailed research is still required.*



PROPOSALS

Proposals...

- Involvement of volunteers should be extended in the data editing.



- New role of the local authorities that may provide the volunteers with open software and equipment but also by facilitating some brief training of the team leader.
- Reduction of registration fees.

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