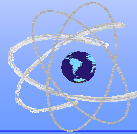# Low cost cadastral updating approach: an alternative for the Brazilian cities
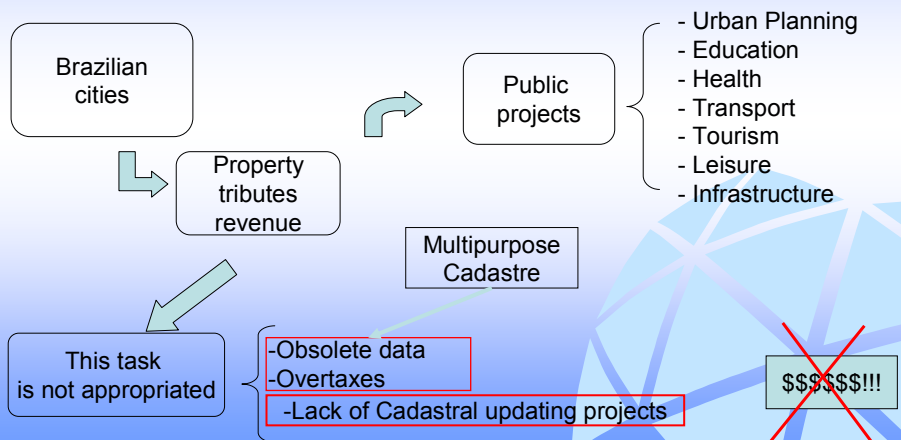
Guilherme Henrique Barros de Souza

Amilton Amorim

Julio Kiyoshi Hasegawa

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Introduction

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Brazilian cities

Property tributes revenue

Public projects

- Urban Planning
- Education
- Health
- Transport
- Tourism
- Leisure
- Infrastructure

Multipurpose Cadastre

This task is not appropriated

-Obsolete data
-Overtaxes
-Lack of Cadastral updating projects

$$$$$!!!

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Introduction

- The current technological situation allows to invest in low cost cadastral projects
  - Low cost computers;
  - New equipments to data acquisition like orbital sensors to acquire images from Earth surface;
  - Many possibilities with the free software development;
    - Very important for small and medium cities.

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Objective

- The principal objective of this work is to show the viability of a approach that increases the efficiency of the change detection process applied to the property cadastre.

Images + Cadastral Database
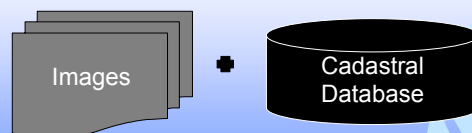
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Cadastral Updating and change detection

- Mapping is a basic tool in the process of making decision in public administration. However its existence is very scarce.

- In agreement with IDB (International Database) 72 % of the municipalities of the Latin America does not have maps of its jurisdiction in paper and not even in digital environment (COHEN 2000).

Cadastral Updating and change detection

- In the urban reality, the problem becomes even bigger, because the change dynamism is high, due several factors such as
  - new allotments;
  - new buildings;
  - new infrastructure systems;
- All these changes must be contemplated in the cadastral data. In this work only geometric building data was considered

Cadastral Updating and change detection

- Change Detection is a important tool for updating;
- The change detection between images of different times has been researched in several areas of knowledge.
- Olsen et al (2002) had affirmed that the task of change detection to mapping is not one of the easiest.

Approaches procedures

- For the objective of time and cost reduction of this work to be reached, it was proposed the development of a technique that predicts the identification of new constructions or buildings that suffered significant changes in their built area in the last years.

Approaches procedures
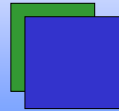
- Algor... ...were imple... ...ng the chang... ...The metho... ...ction is the a...

Older image

...nges highlighted

Approach Procedures

Changed Area Calculating Process

To obtain change vertexes values

In the same reference system that the coordinates recorded in cadastral database

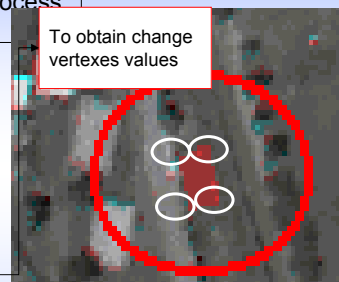If this doesn't occur
- Ground Points
- Planar Transformation

In the end of this process, a text file is generated with the middle point of each change measured.

Anaglyph Model

↓
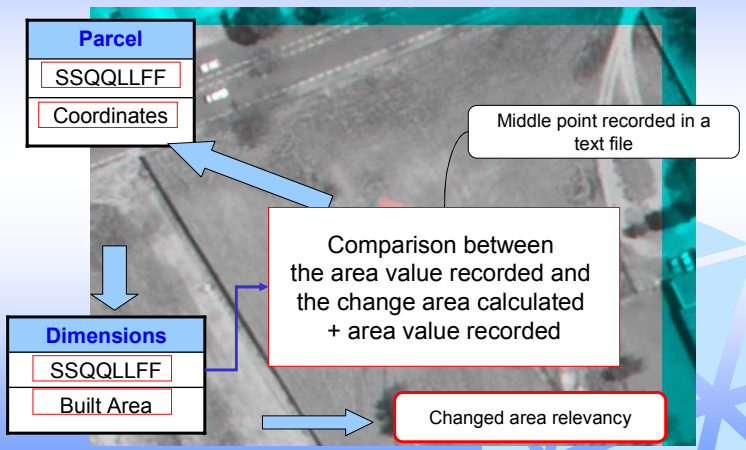
Point measurements

↓

Gauss' formula → Changed area value

↓

All values are recorded In a text file

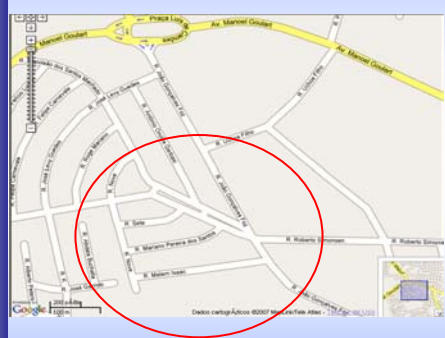# Cadastral database querying process

Parcel
SSQQLLFF
Coordinates

Middle point recorded in a text file

Comparison between the area value recorded and the change area calculated + area value recorded

Dimensions
SSQQLLFF
Built Area

Changed area relevancy

Test areas

Pine's Garden

Rose's Garden

Results – Test area 1

100 parcels selected
19 changes found

Results – Test Area

Used approach	NTI	NIA	NIAR	NISL	TGIC	TGIED	TTGM
Conventional	100	19	19	100	20 min	6 min	2,600 min
Conventional + Optic Reading	100	19	19	100	20 min	0.017 min	2,001.7 min
Change Detection (CD)	100	19	19	19	20 min	6 min	494 min
CD + Optic Reading	100	19	19	19	20 min	0.017 min	380.323 min
CD + Relevancy	100	19	19	19	20 min	6 min	494 min
CD + Relevancy + Optic Reading	100	19	19	19	20 min	0.017 min	380.323 min

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Results – Test Area 2

50 parcels selected
2 changes found

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Results – Test area 2

Used approach	NTI	NIA	NIAR	NISL	TGIC	TGIED	TTGM
Conventional	50	2	2	50	20 min	6 min	1,300 min
Conventional + Reading Optic	50	2	2	50	20 min	0.017 min	1,000.034 min
Change Detection (CD)	50	2	2	2	20 min	6 min	52 min
CD + Reading Optic	50	2	2	2	20 min	0.017 min	40.034 min
CD + Relevancy	50	2	2	2	20 min	6 min	52 min
CD + Relevancy + Reading Optic	50	2	2	2	20 min	0.017 min	40.034 min

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Costs Reduction Evaluation

Areas	Approach	NTI	NISL	Cost by property	Approach total cost
Area 01	Conventional	100	100	R$ 18,00	R$ 1800,00
	CD	100	19	R$ 18,00	R$ 342,00
Area 02	Conventional	50	50	R$ 18,00	R$ 900,00
	CD	50	02	R$ 18,00	R$ 36,00

US$ 1112.00
€ 720.00

US$ 211.00
€ 136.00

Only surveying costs!

City:
20000 properties
US$ 225,000.00
€ 145,000.00

City: 19% of changes
3800 properties
US$ 43,000.00
€ 27,300.00

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Conclusions

- By analyzing of the reduction of time and costs aquisition data, it is possible to affirm that the method here proposed is efficient and allows an economical resources optimization for the public administration;

- It possibilits favorable framework for administration to do cadastral updating periodic campaigns;

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Conclusions

- In further researchs, we intend to use QuickBird images to test the approach together with automatic techniques;
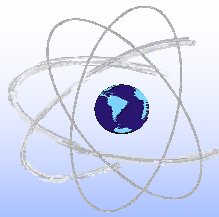
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Acnowledgements

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Thank you so much
for your attention!!!!

Muito
Obrigado!!!

Souza, G. H. B.