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26th ESRI International User Conference

Using geocoding to improve data quality

Paper 2016

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The Company



Distribution System

- 340+ Substations
 - 100,000+ mi of distribution lines
 - 3,200,000+ million customers
 - 2,200,000+ million poles
- 300,000+ transformers



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History

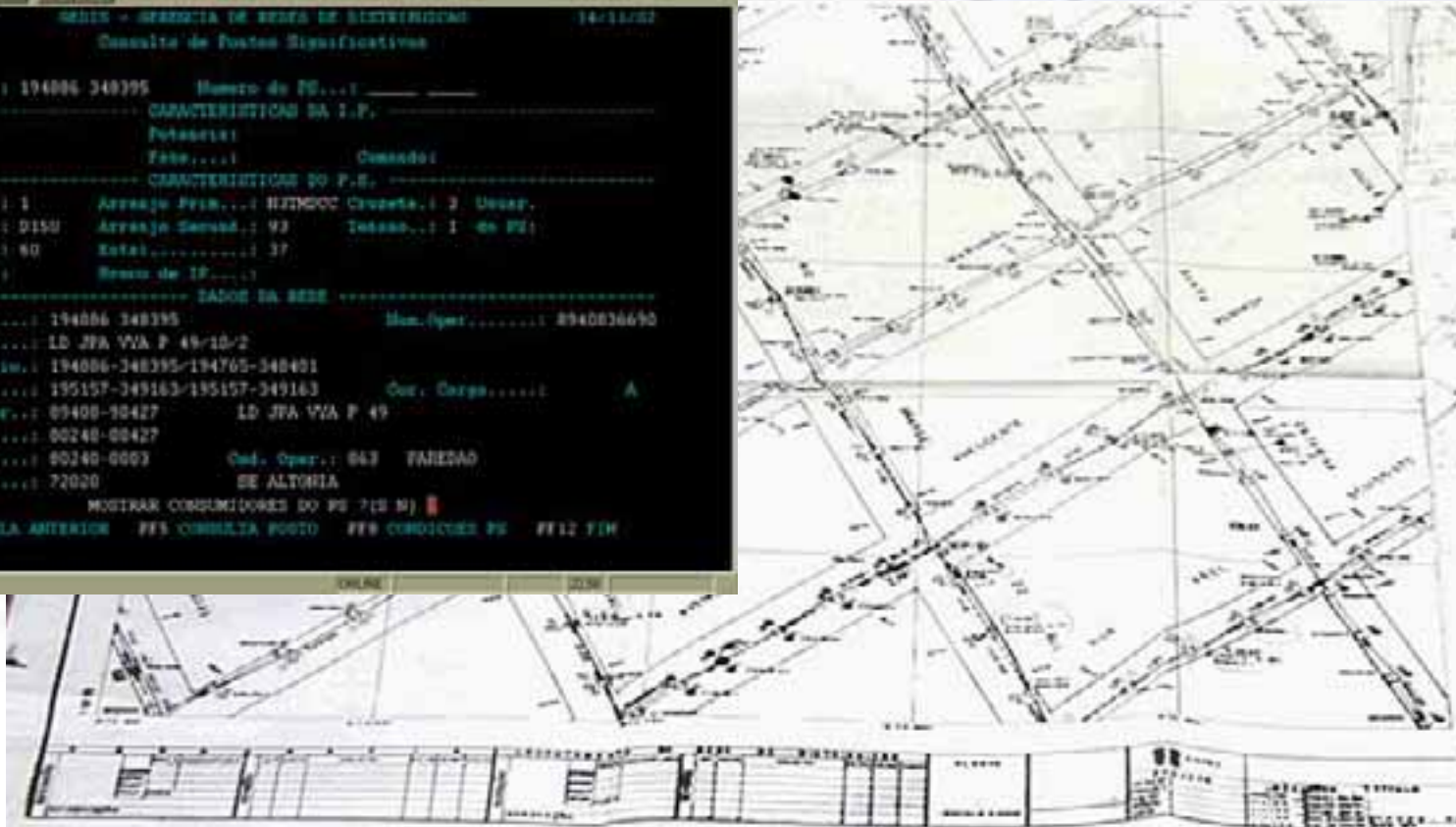
- The use of UTM coordinates at COPEL
- Beginning in 1975
- GEDIS / GCO → coordinates as attributes
- 251992,7236889 → 251992236889
- Alphanumeric terminals (3270)
- No visual “feedback”
- GIS implementation in 1997



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1974 - 1996 Gedís System

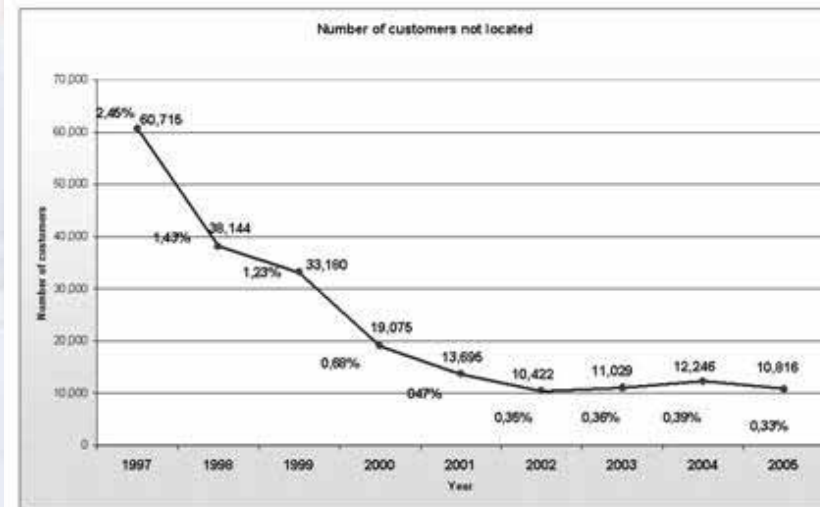
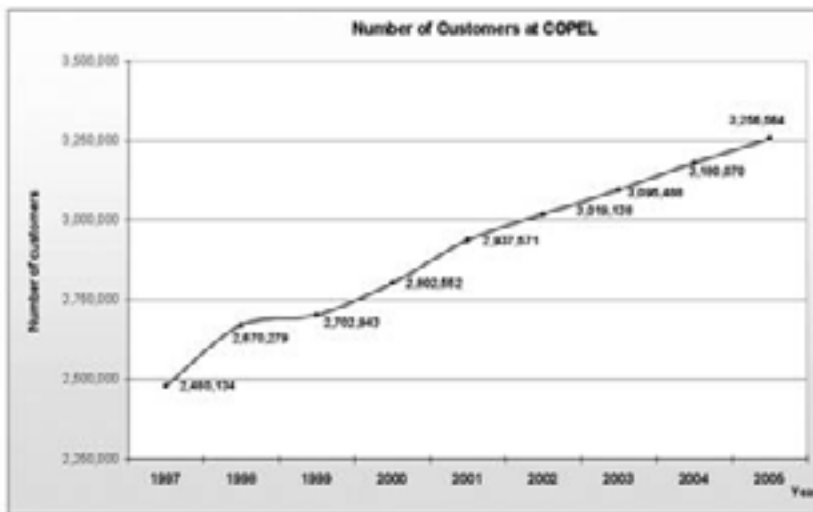
- alfanumeric
- paper maps





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Evolution of number of customers x customers with unknown coordinates



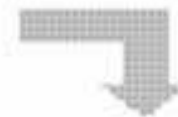
Geocoding

- Modern software:
 - ArcGIS (ESRI)
 - Oracle Spatial
 - Smallworld

Endereço: Rua Coronel Dulcídio, 800



Geocoder



Coordenadas
X,Y



Data model suitable

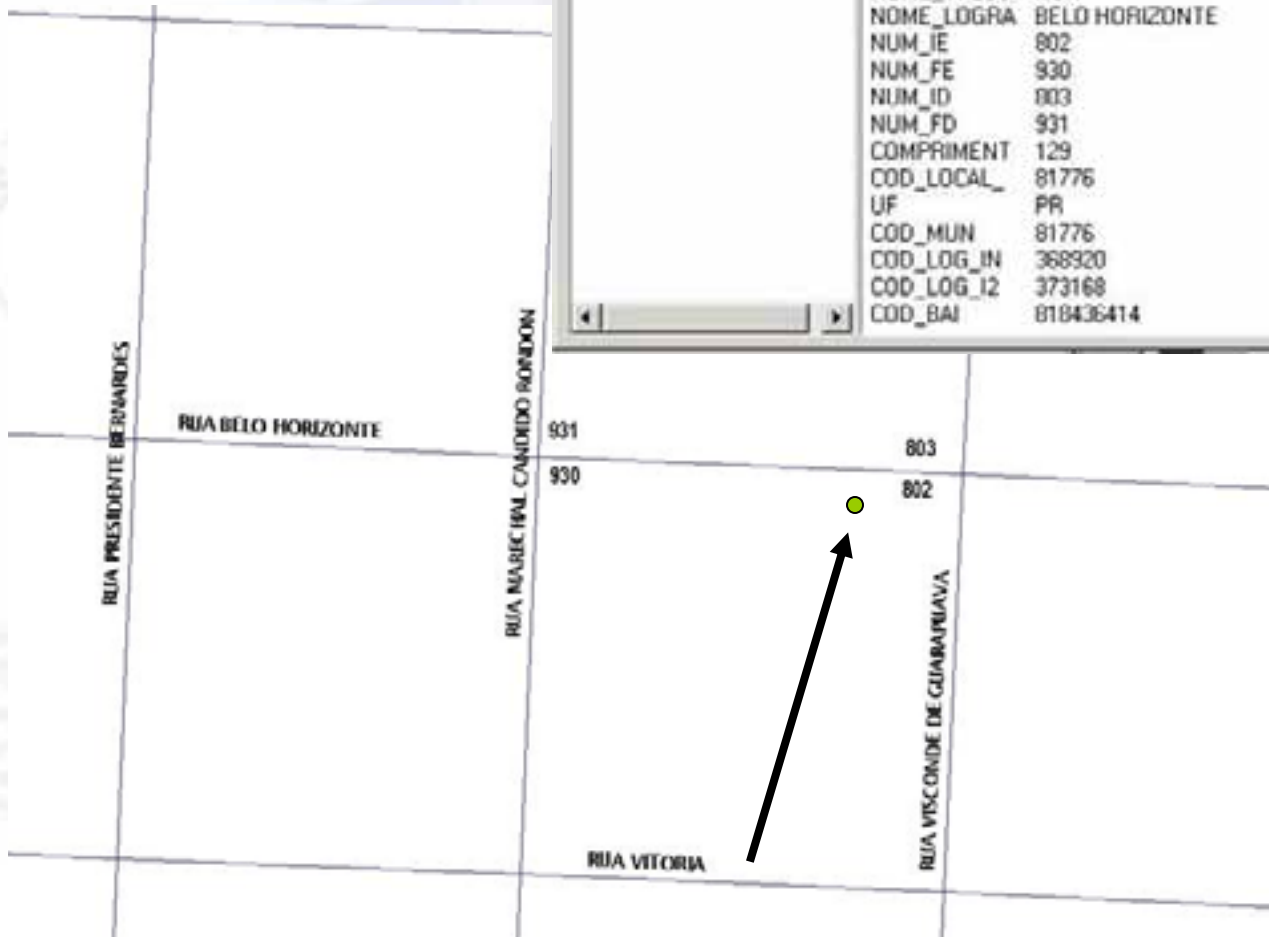
Identify Results

Layers: <Top-most layer>

trecho_log_cel_apos_cmp Location: [251263.557273 7236916.173873]

RUA

Field	Value
FID	710
Shape	Polyline
FEAT_NUM_T	613225688
COD_LOG	366269
NOME_TPLOG	RUA
NOME_LOGRA	BELO HORIZONTE
NUM_JE	802
NUM_FE	930
NUM_ID	803
NUM_FD	931
COMPRIMENT	129
COD_LOCAL_	81776
UF	PR
COD_MUN	81776
COD_LOG_IN	368920
COD_LOG_I2	373168
COD_BAI	818436414



Rua Belo Horizonte 840

251992,7236889

Geocoding results:

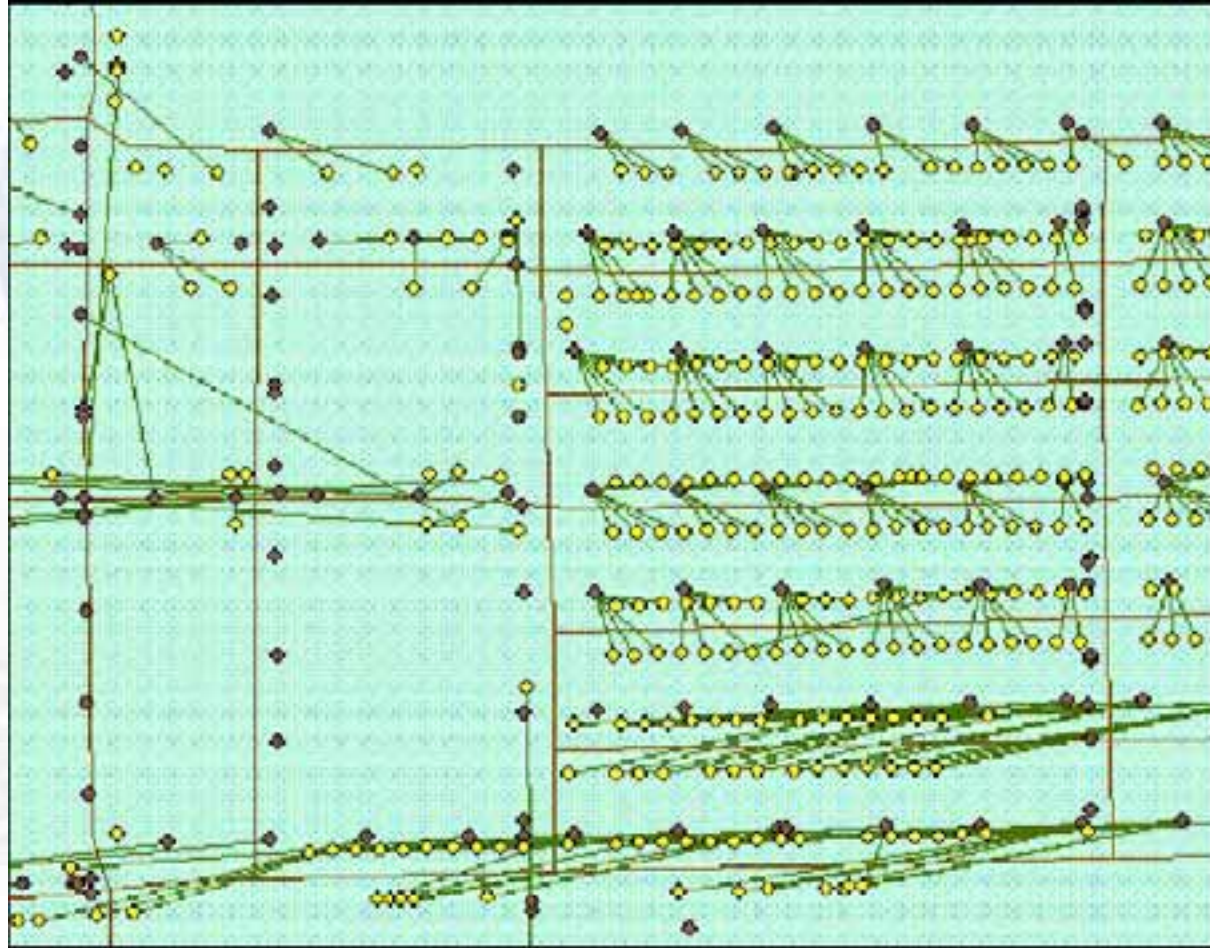
Item	Summary of customers	Number of customers	%
1	Total number of customers (SQL query)	89.277	100,00
2	Matched records	55.745	62,44
3	Unmatched records	33.532	37,56

Item	Summary	Customers	%
1	Number of records matched	55.745	100,00
2	Coordinates less than 100 meters	26.760	48,00
3	Coordinates between 100 and 200 meters	8.018	14,38
4	Coordinates between 200 and 999 meters	14.886	26,70
5	Coordinates between 1000 and 4,999 meters	5.971	10,71
6	Coordinates between 5,000 and 9,999 meters	83	0,15
7	Coordinates located more than 10,000 meters	27	0,05



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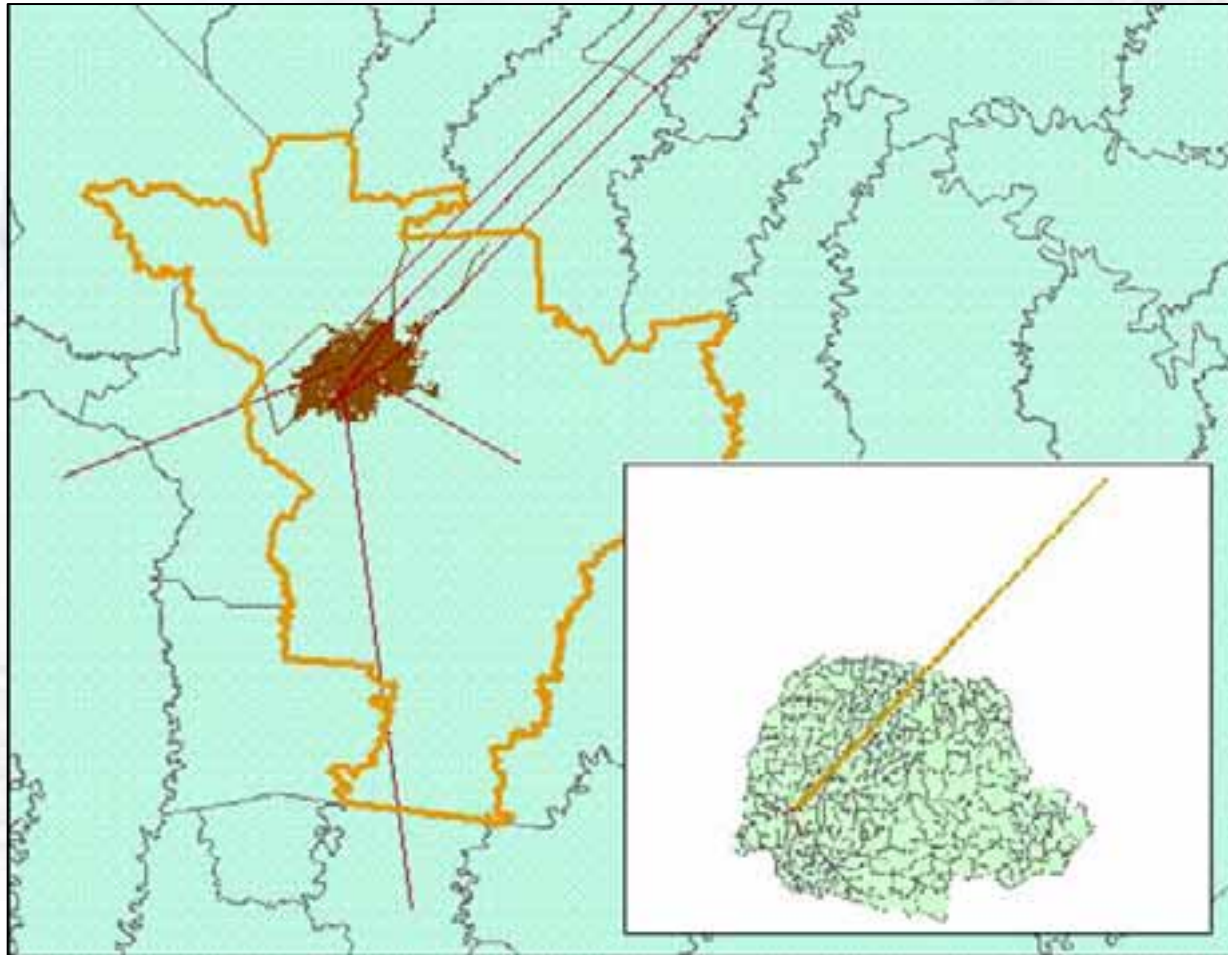
Graphic analysis: distance less than 200 m



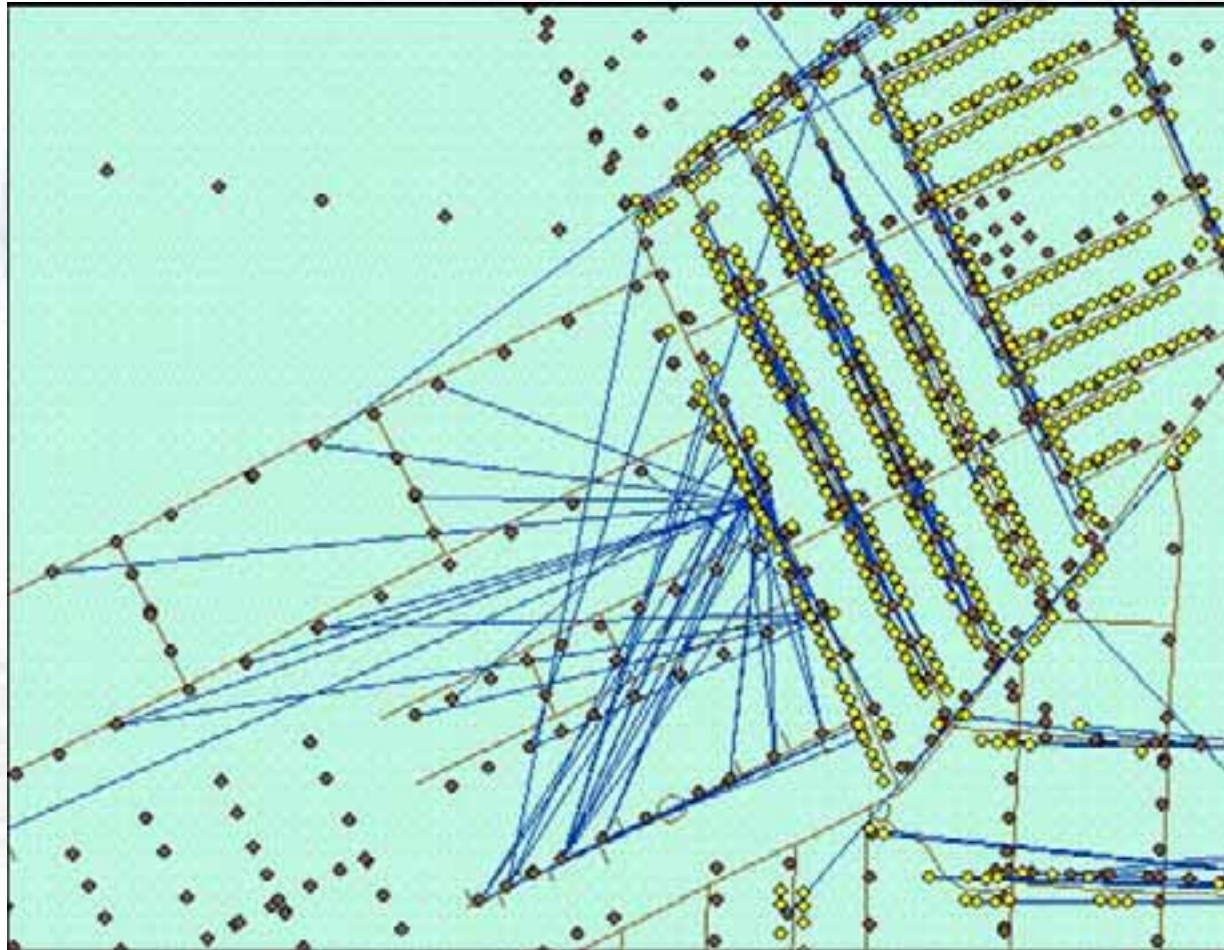


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Graphic analysis: distance bigger than 10,000 m.



Graphic analysis: distance between 200 and 9,999 m.





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Graphic analysis: distance between 5,000 and 9,999 m.





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Identifying the errors (customer records):

- Wrong street (Avenida das Torres X Rua das Torres)
- Wrong abbreviation:
FRANCISCO >> FCO
- Lack of standardization:
BARAO DO RIO BRANCO >> BARAO RIO BRANCO
- Wrong type of street: Street instead of Avenue;
- Typo errors: **use of portuguese characters**;
- Part of the street name missing;
- Null street name;
- House number with zero;



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Identifying the errors (street records):

- Wrong numbers in street center lines;
- Wrong sequence in house numbers;
- Wrong 'start of street' ;
- Error in house number.



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Final remarks

- It is possible to improve data quality with geocoding
- It provides a “suggested location”
- Using another system (Webgeo) it is possible to find the correct pole for a customer
- A “clean-up” of the street base is currently going on
- There is a need to modify our data model for street center lines (to use house numbers)
- We must carefully review the customer insertion process