COPEL

Pura Energia

PARANÁ

GOVERNO DO ESTADO

GIS for Inside Plants of Telecommunications

Hideson Alves da Silva

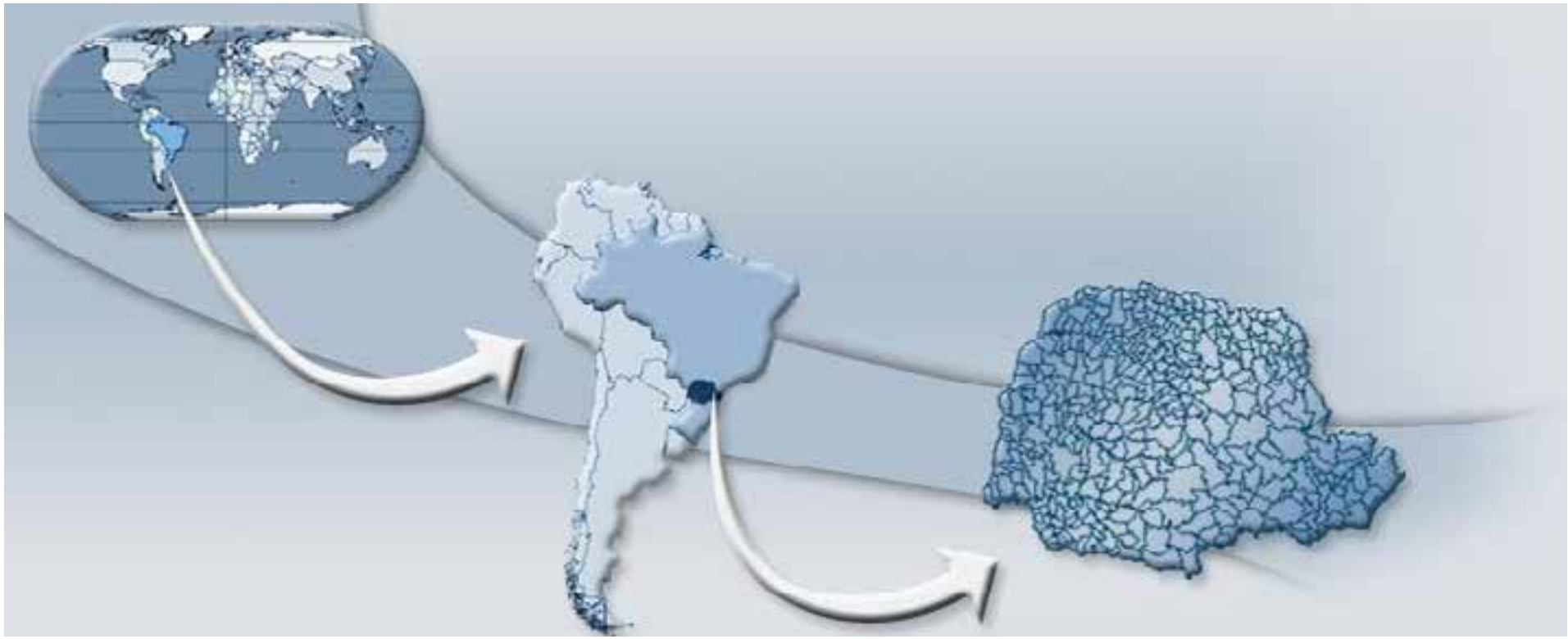
Systems Analyst of Copel Telecommunications

Agenda

Agenda:

- Copel Telecommunications
- OSS
- GIS for OSS
- GIS for OSS at Copel Telecom
- Project Optimization

Where is Paraná State?



Fonte: http://www.diaadiaeducacao.pr.gov.br/portals/portal/mapas/localizacao_parana.php

COPEL Holding

TELECOMMUNICATIONS

With Copel Telecom, Paraná state became the first Brazilian State to have 100% digital coverage. Its 399 municipalities have optical fiber network installed.

GENERATION

Copel operates 21 power stations of its own, 19 hydroelectric, 1 thermoelectric and 1 wind power station.

TRANSMISSION

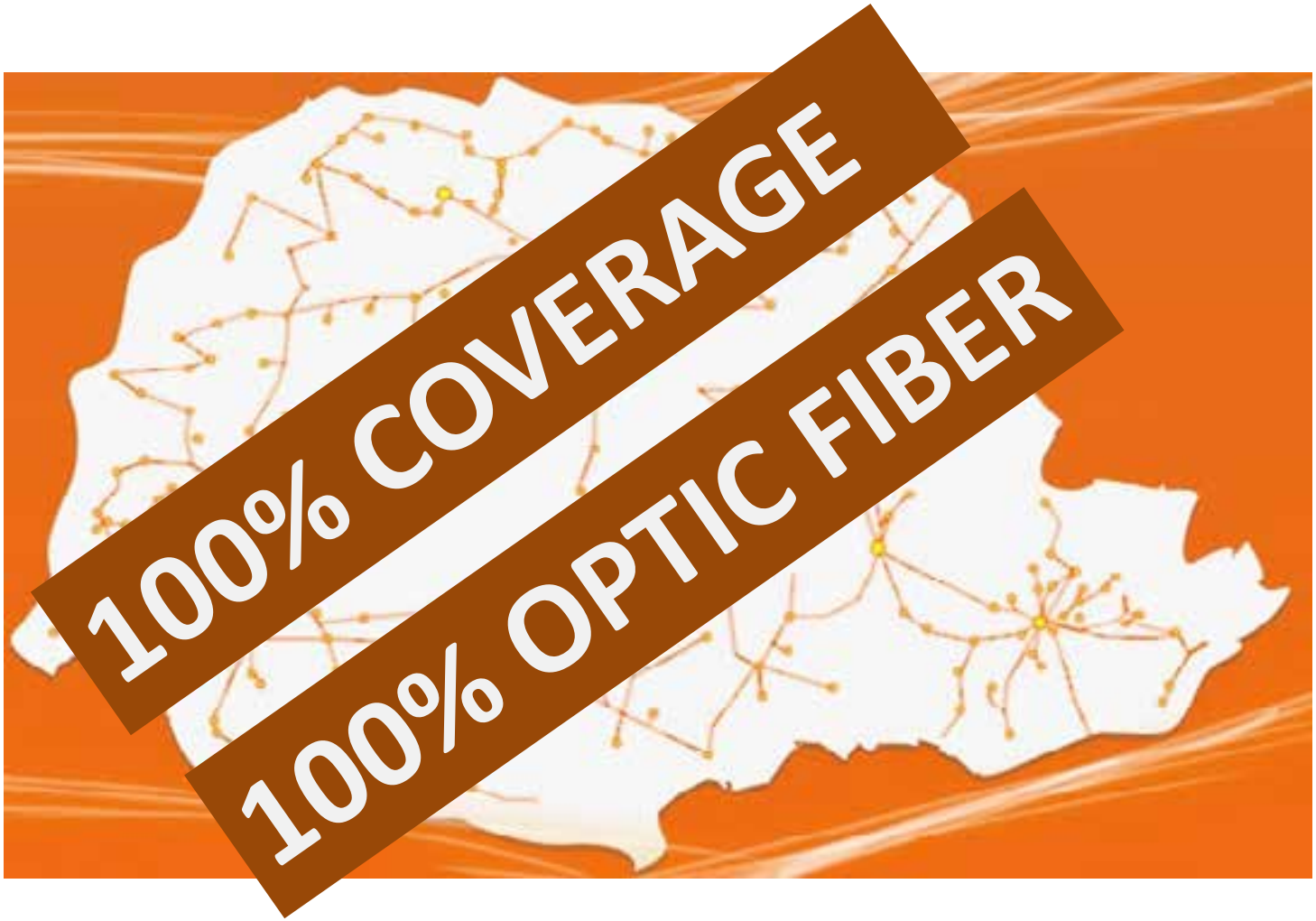
The power transmission system is responsible for operation and maintenance of 32 substations and 2,170 km of lines.

DISTRIBUTION

The electric power distribution system attends more than four million consumers in Paraná.

Copel also operates in the segments of sanitation and natural gas.

COPEL Telecom



COMPLETE SOLUTIONS

Residential

Small Companies

Large Companies

Public Services

Telecom Operators

Flexibility

Coverage Areas

Optic Fiber

Technology

GIS, OSS and Copel Telecom

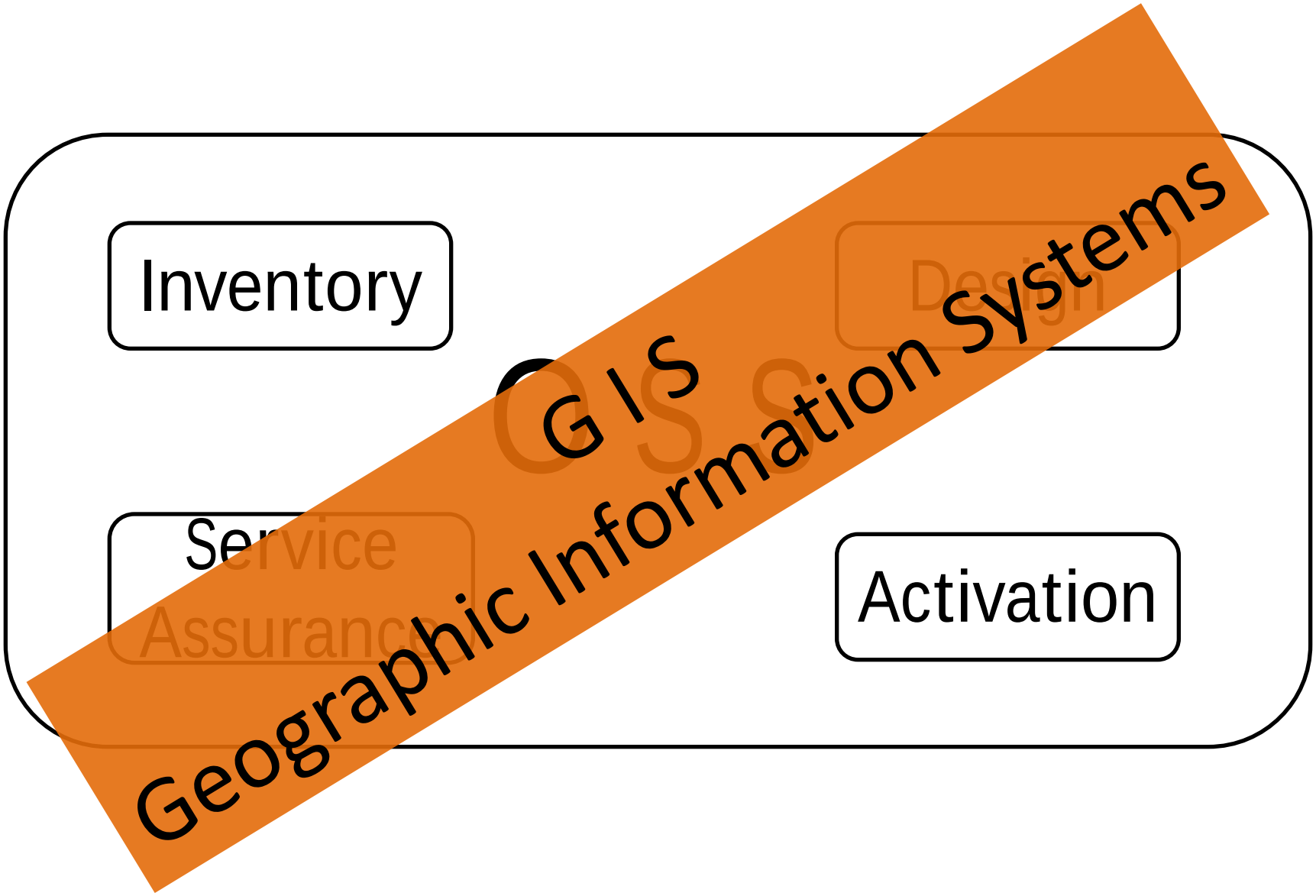
At Copel Telecom, **GIS** solutions with ArcGIS platform are used in **OSS** solutions, and in the support to **commercial solutions**.

OSS - Operational Support Systems

Software (sometimes hardware) applications that support back-office activities which operate a telco's network, provision and maintain customer services.

OSS is traditionally used by network planners, service designers, operations, architects, support, and engineering teams in the service provider.

OSS - Operational Support Systems



OSS with GIS at Copel Telecom

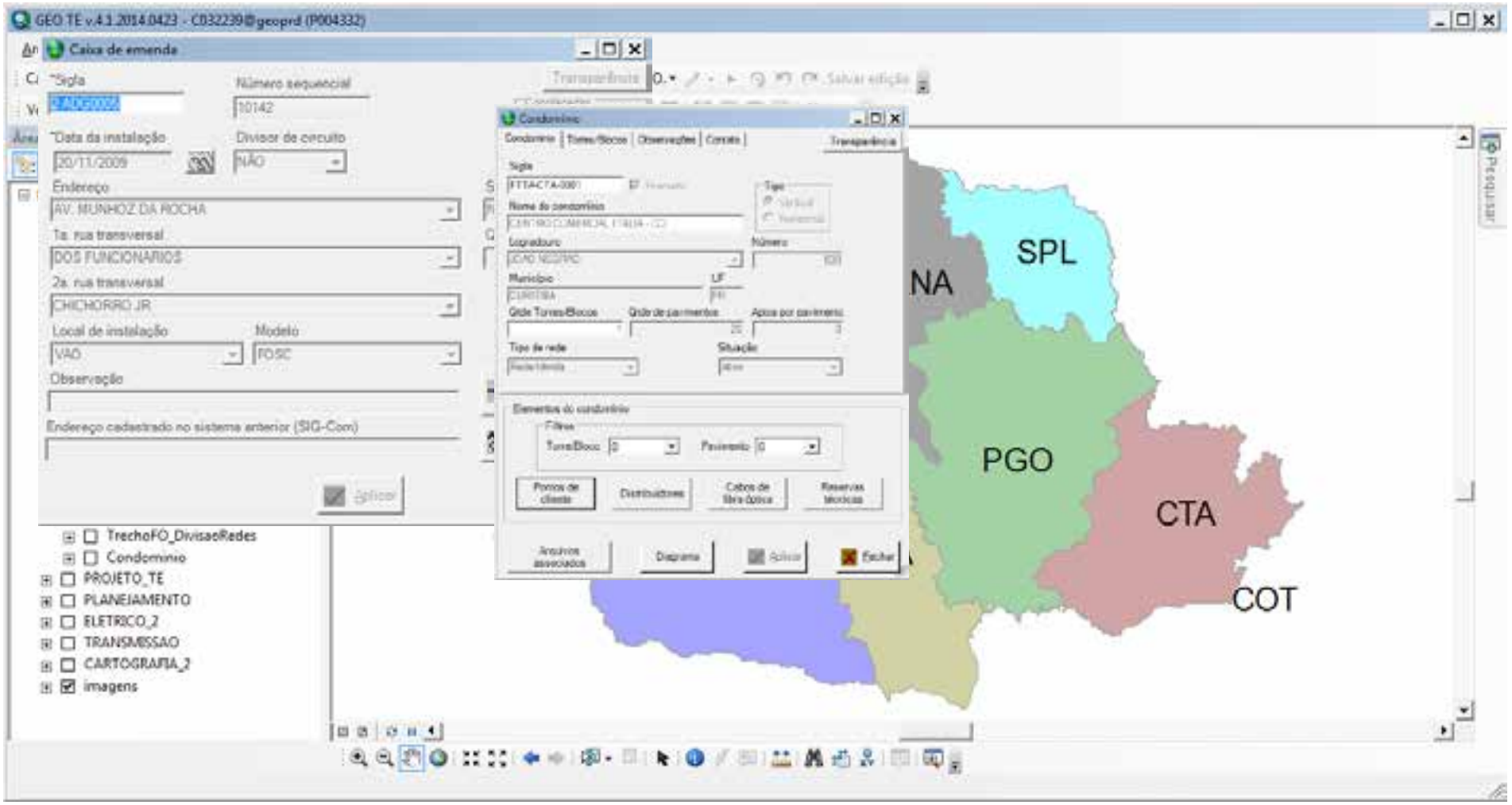
Copel Telecom uses GIS as a tool for:

Ø Inventory

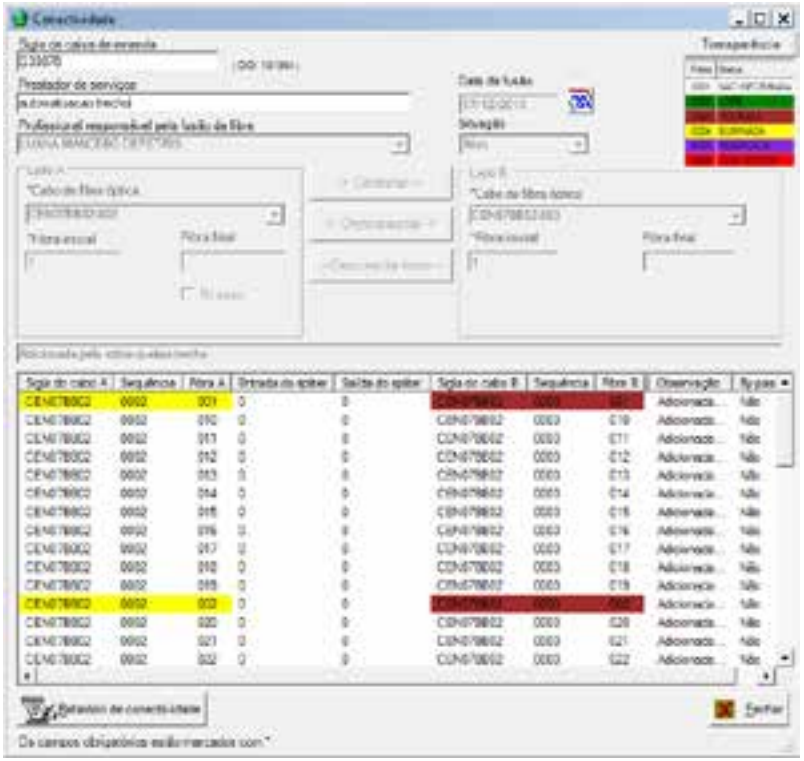
Ø Development of telecommunications network

Ø Support the commercial department

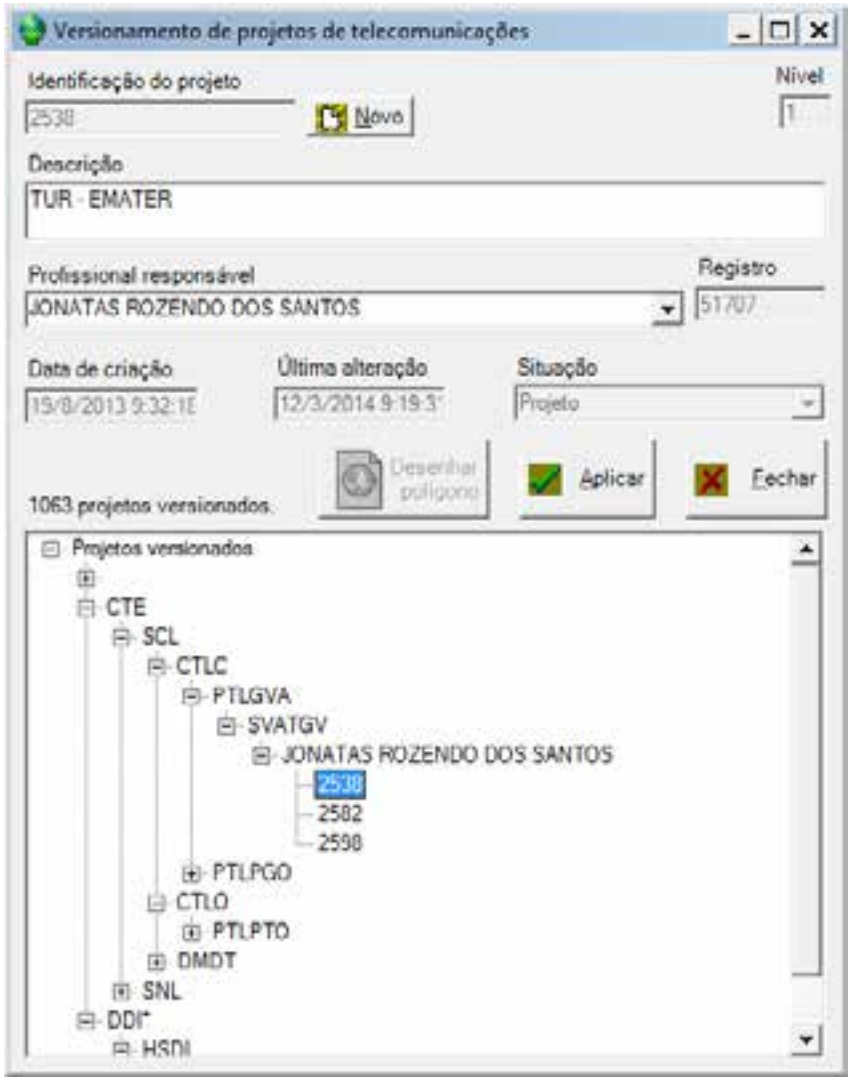
Inventory – “data management”

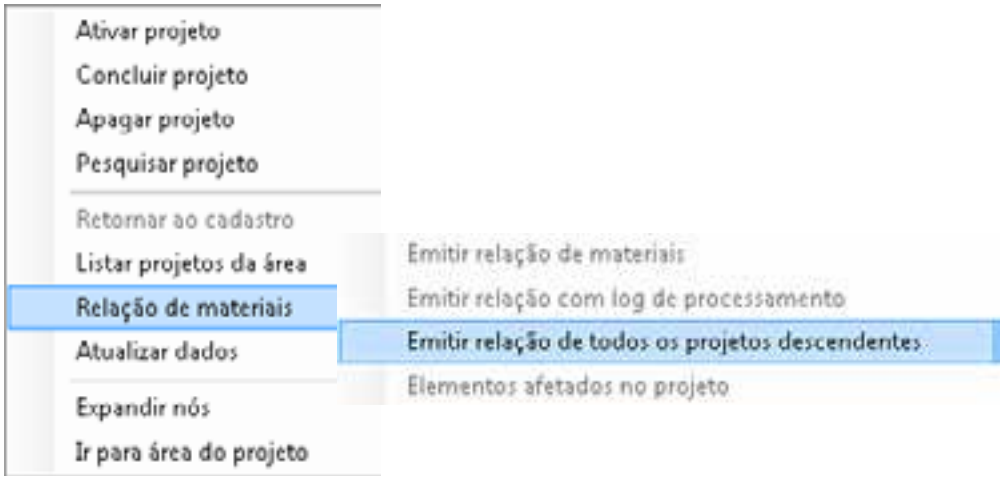


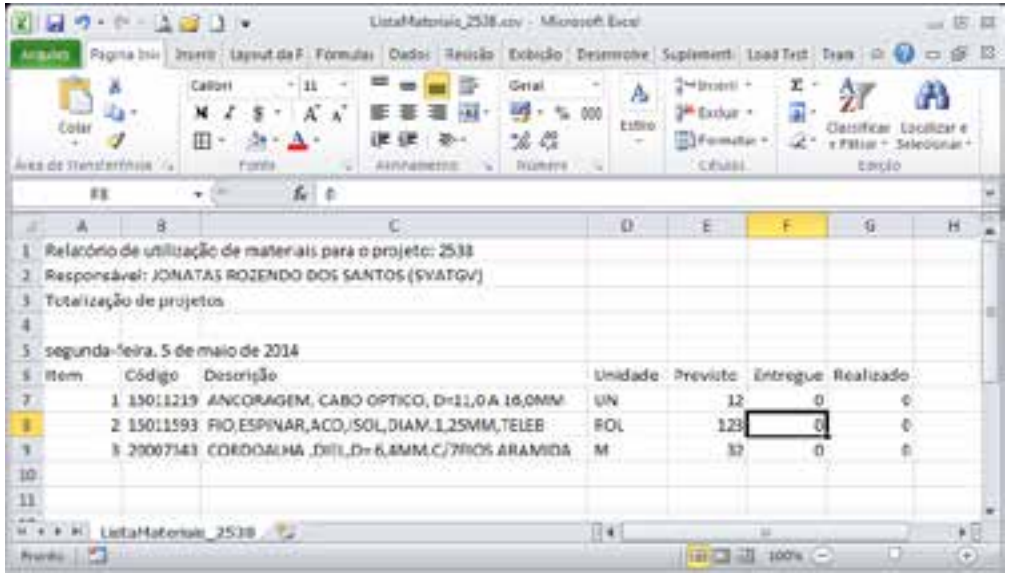
Inventory – “connectivity”



Project management







Business support

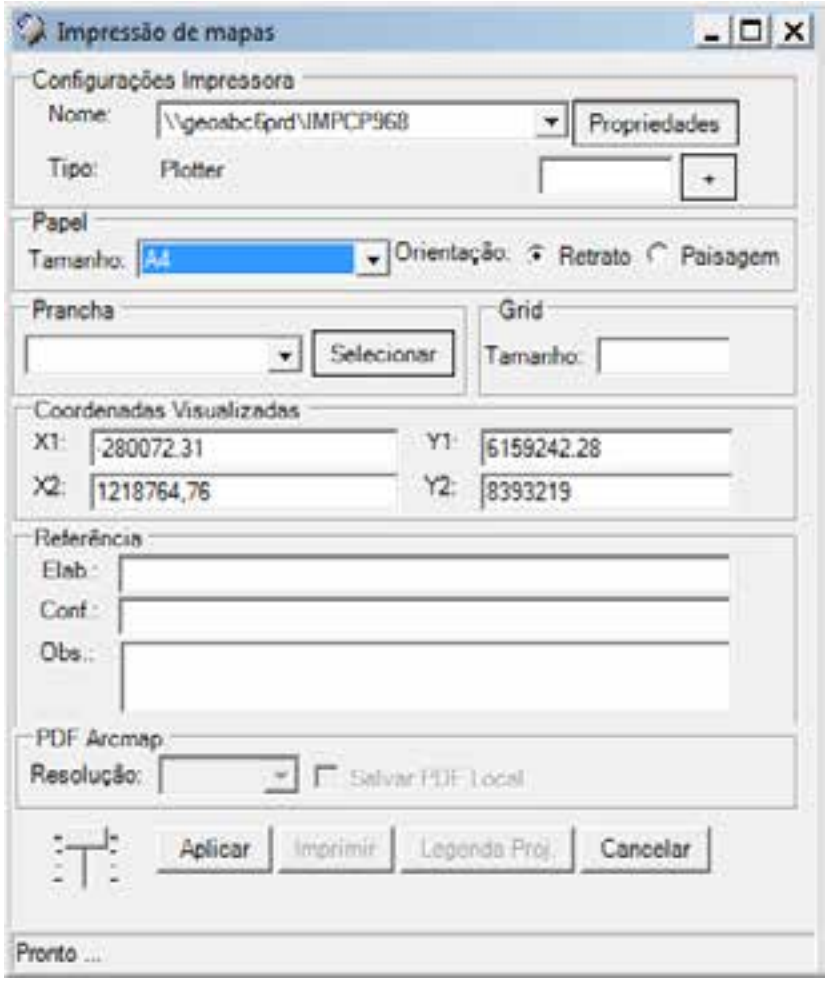
We use GIS for business support in:

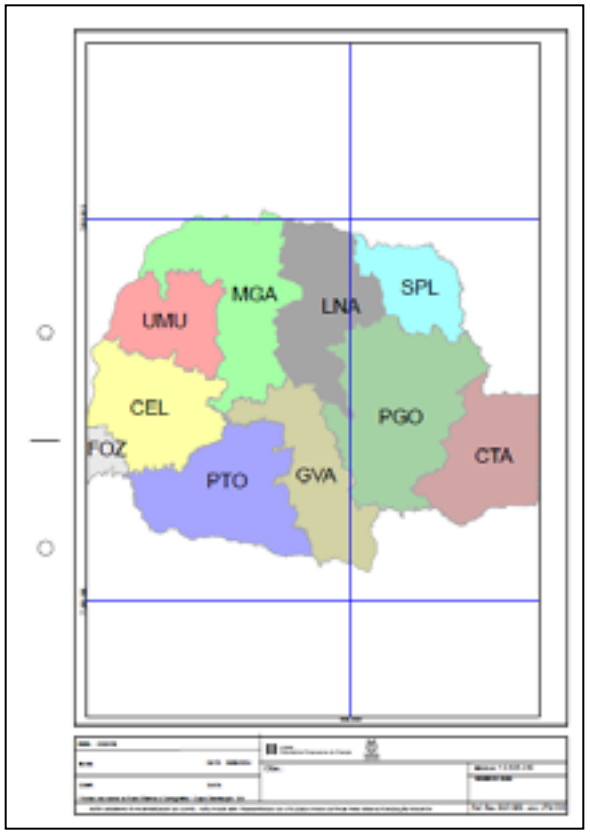
Ø Researches of new markets

Ø Analyses of new client´s viability

Printing

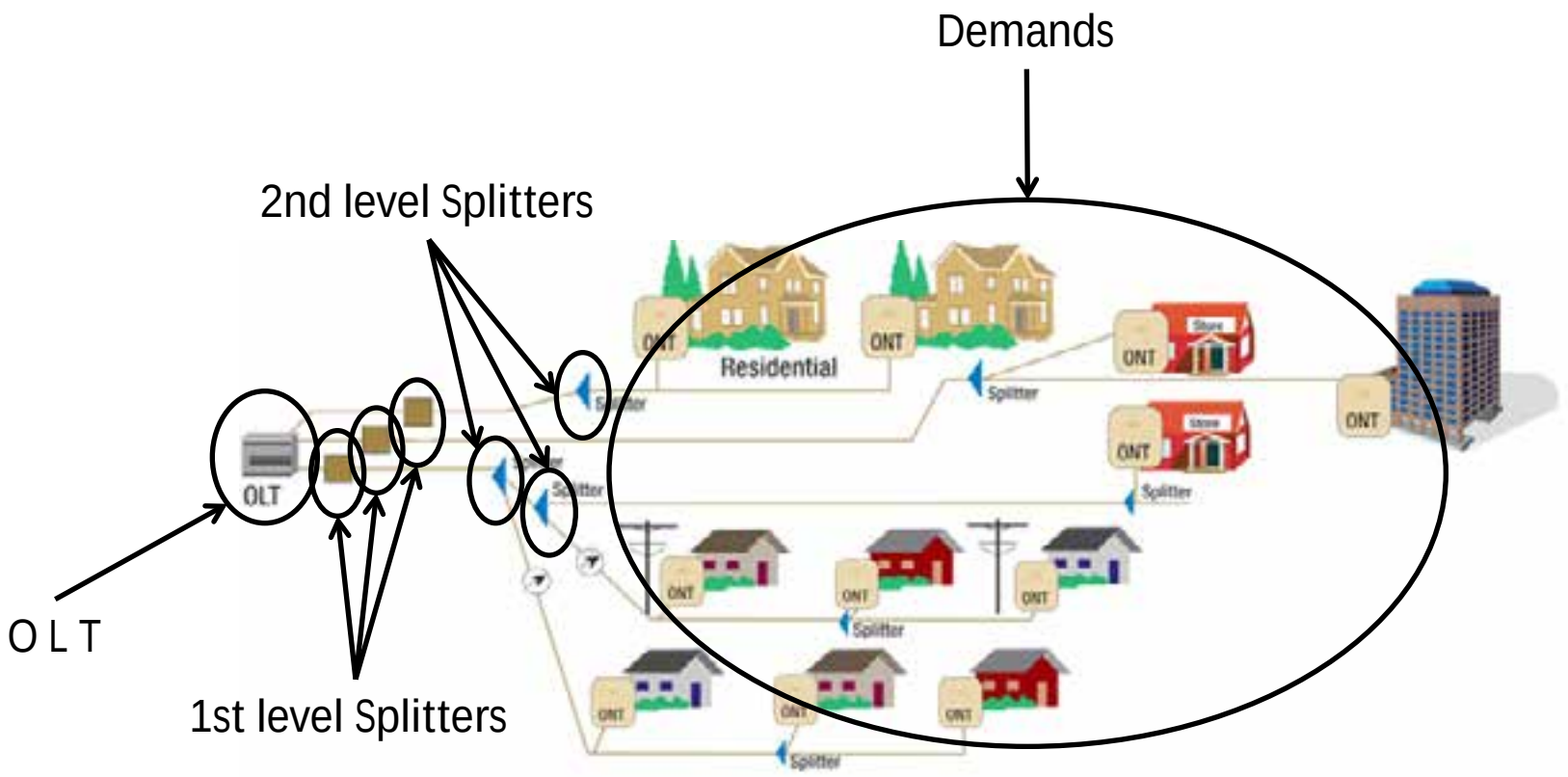
The printing was customized , with the definition of “templates”, in order to meet the company’s standards.





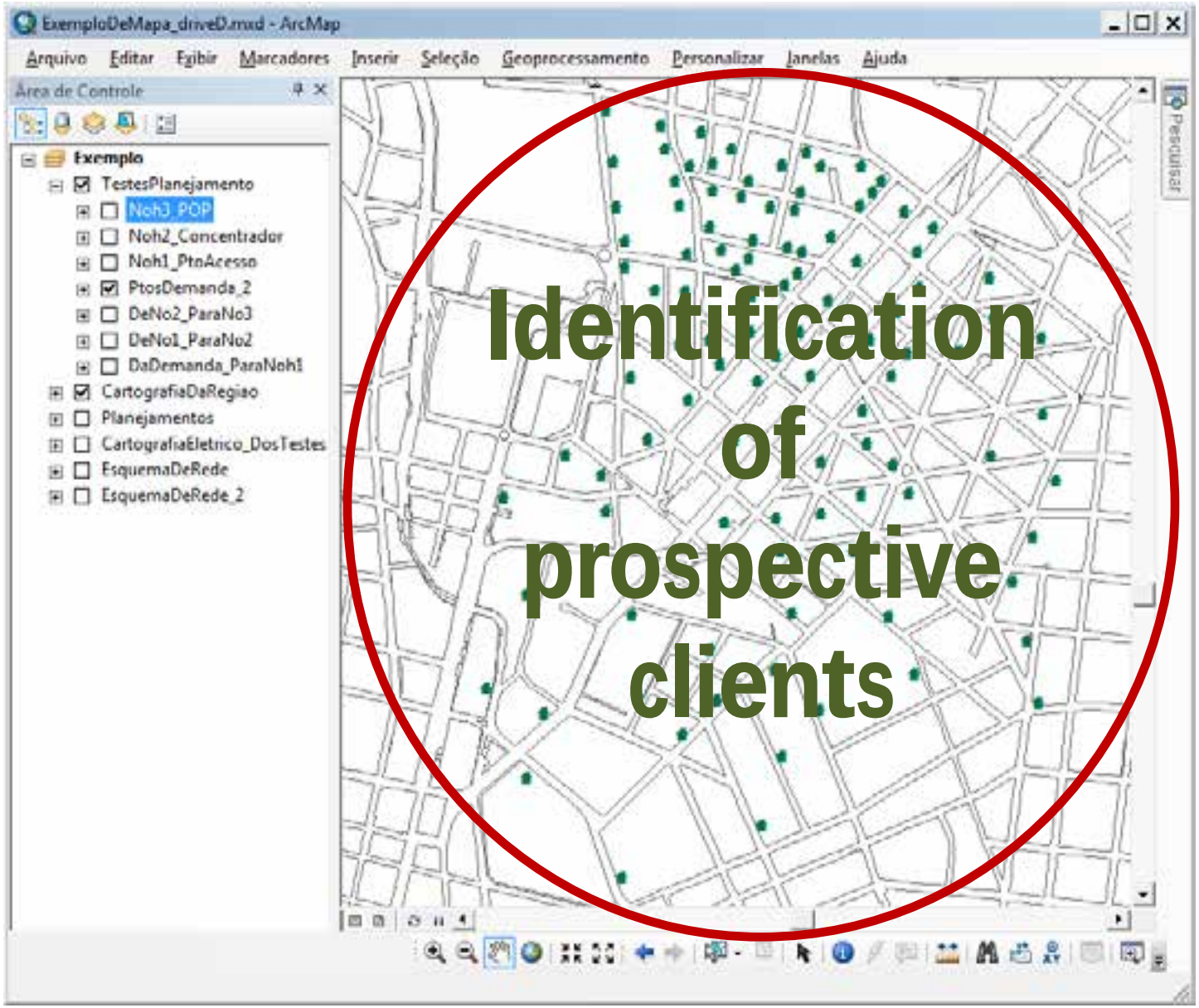
Project Design

R&D – Research and experimental development

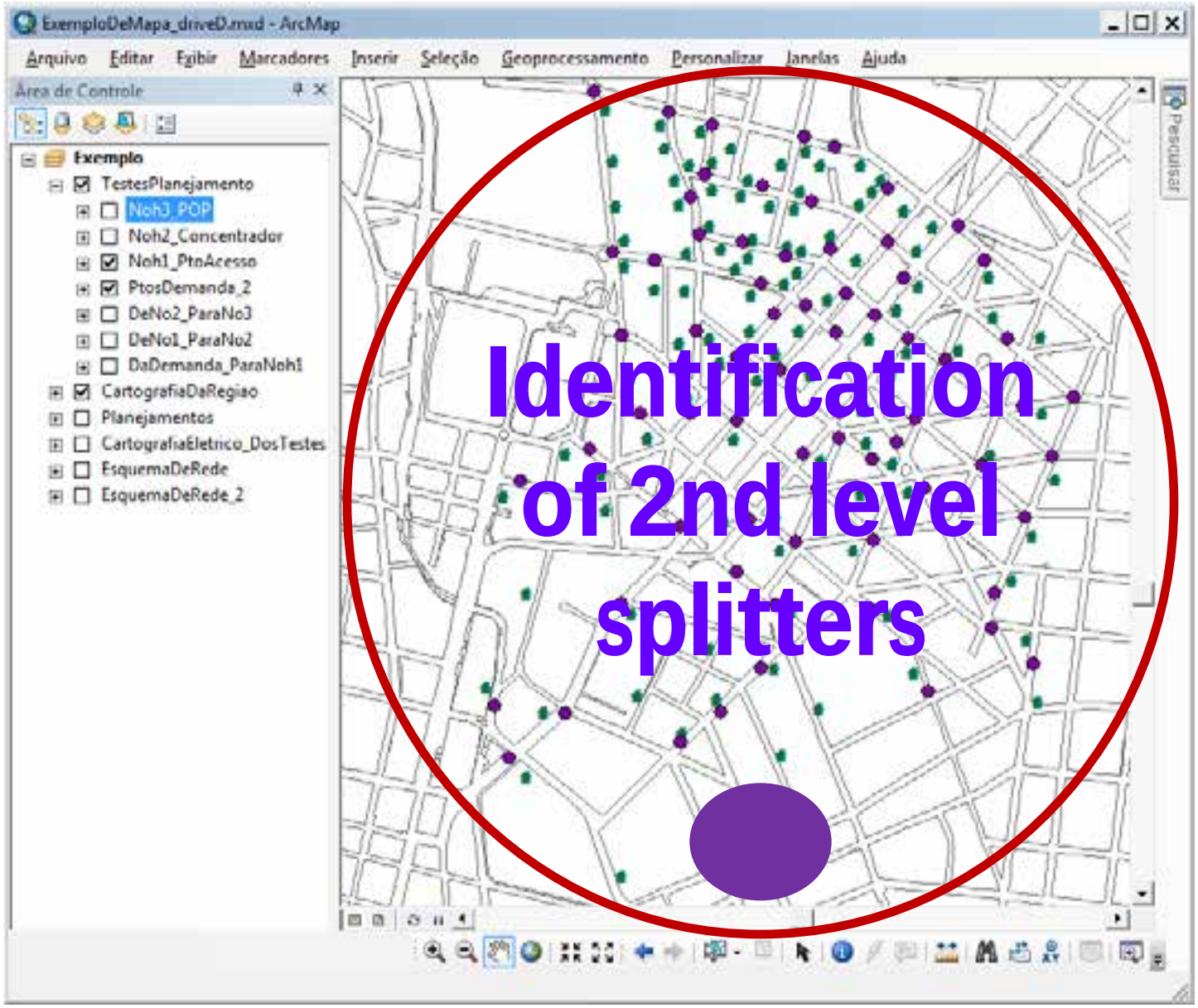


Fonte: http://www.3-edge.de/en/solutions/measure-applications/fttx-pon-networks/FTTx-PON-Network-Overview/

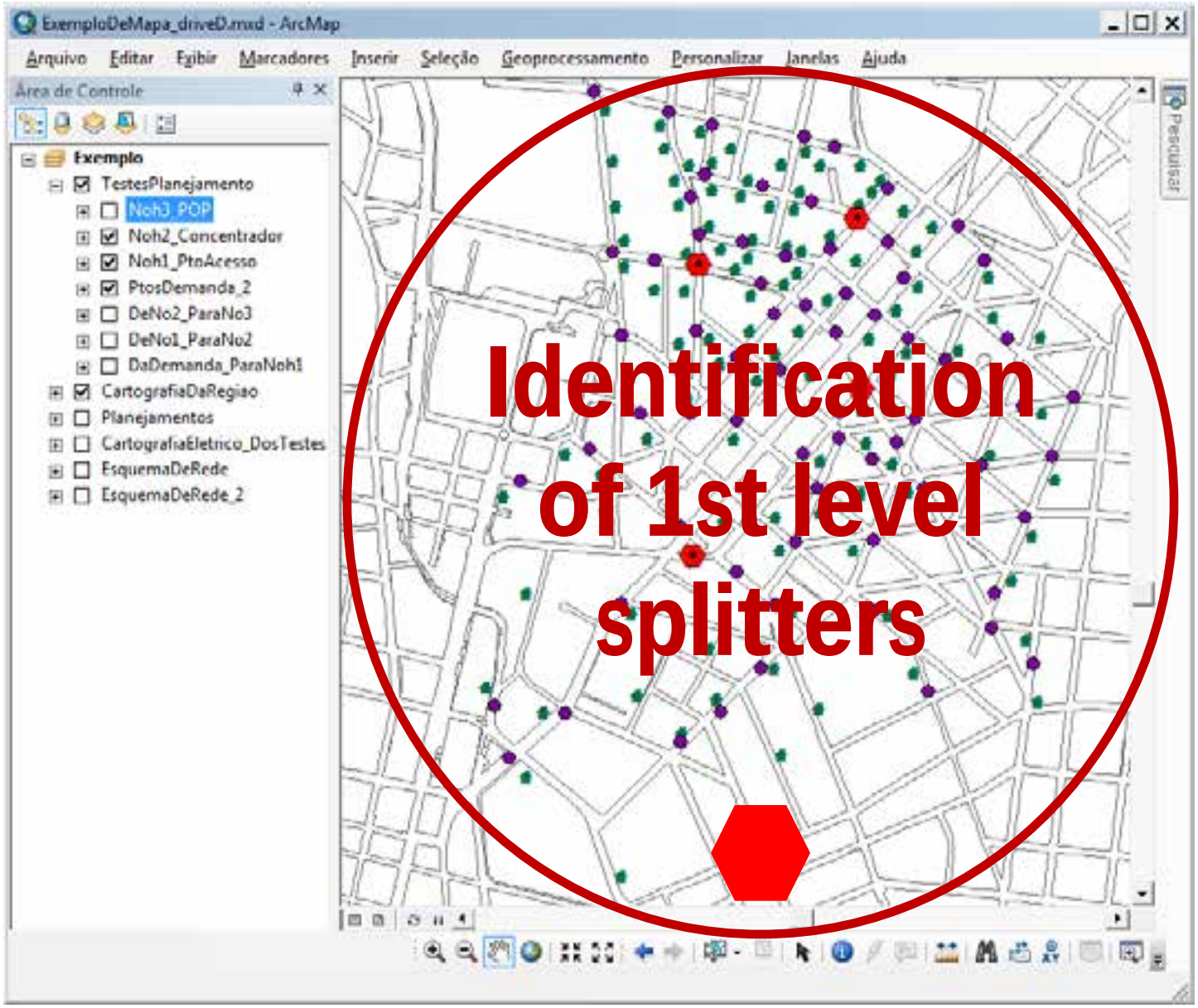
Example


ExemploDeMapa_driveD.mxd - ArcMap
Arquivo Editar Exibir Marcadores Inserir Seleção Geoprocessamento Personalizar Janelas Ajuda
Área de Controle
Exemplo
TestesPlanejamento
Noh3_POP
Noh2_Concentrador
Noh1_PtoAcesso
PtosDemanda_2
DeNo2_ParaNo3
DeNo1_ParaNo2
DaDemanda_ParaNoh1
CartografiaDaRegiao
Planejamentos
CartografiaEletrico_DosTestes
EsquemaDeRede
EsquemaDeRede_2
Identification of prospective clients

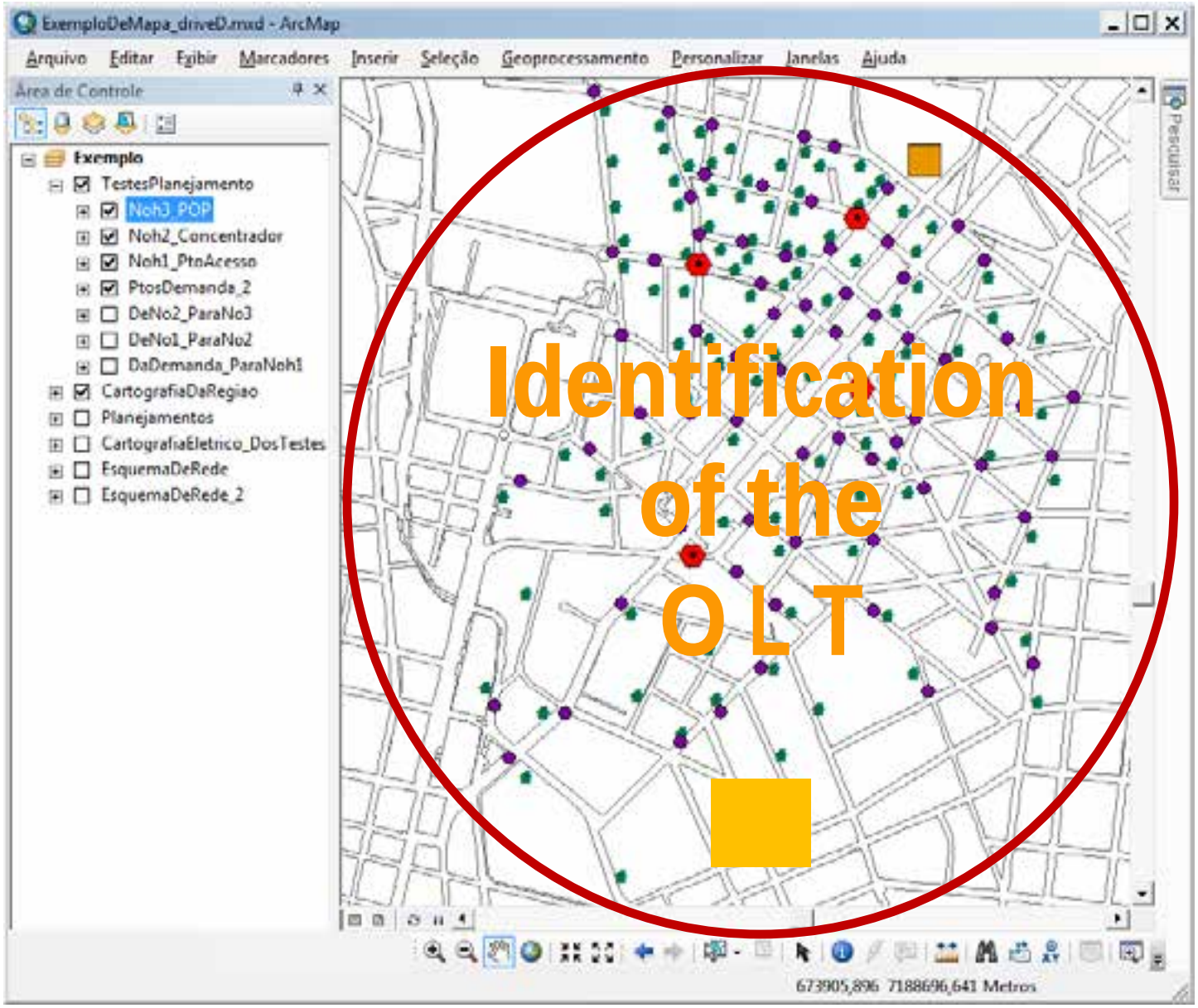
Example - step 1



Example – step 2



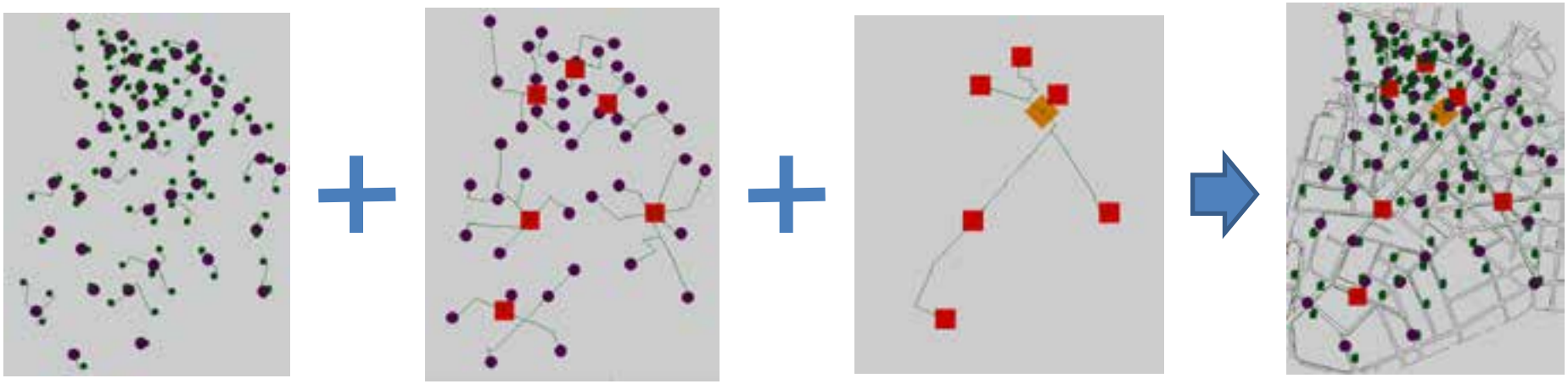
Example – step 3



Example – steps

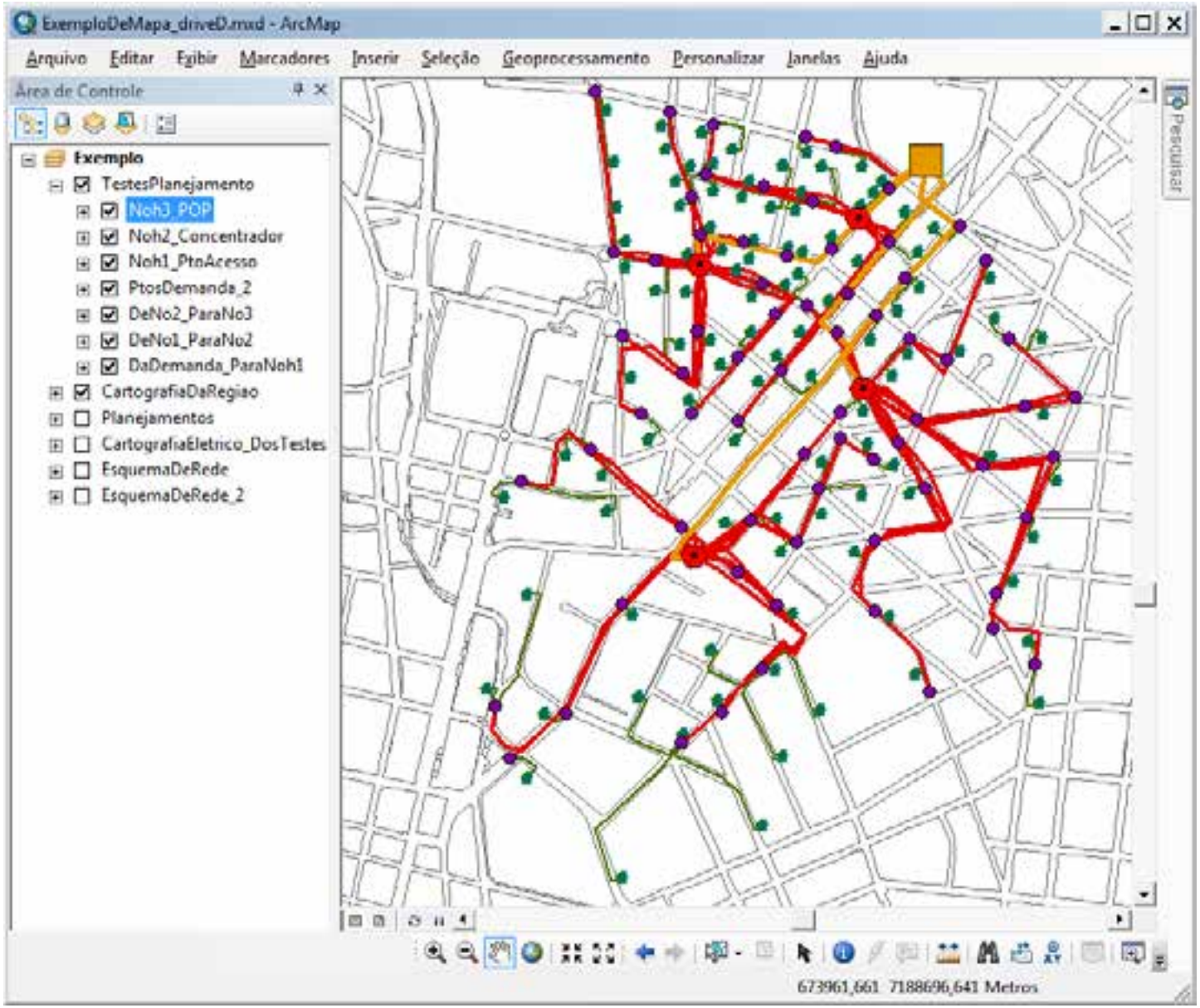
Results

A network planning with spatial definition of the necessary equipment installation.



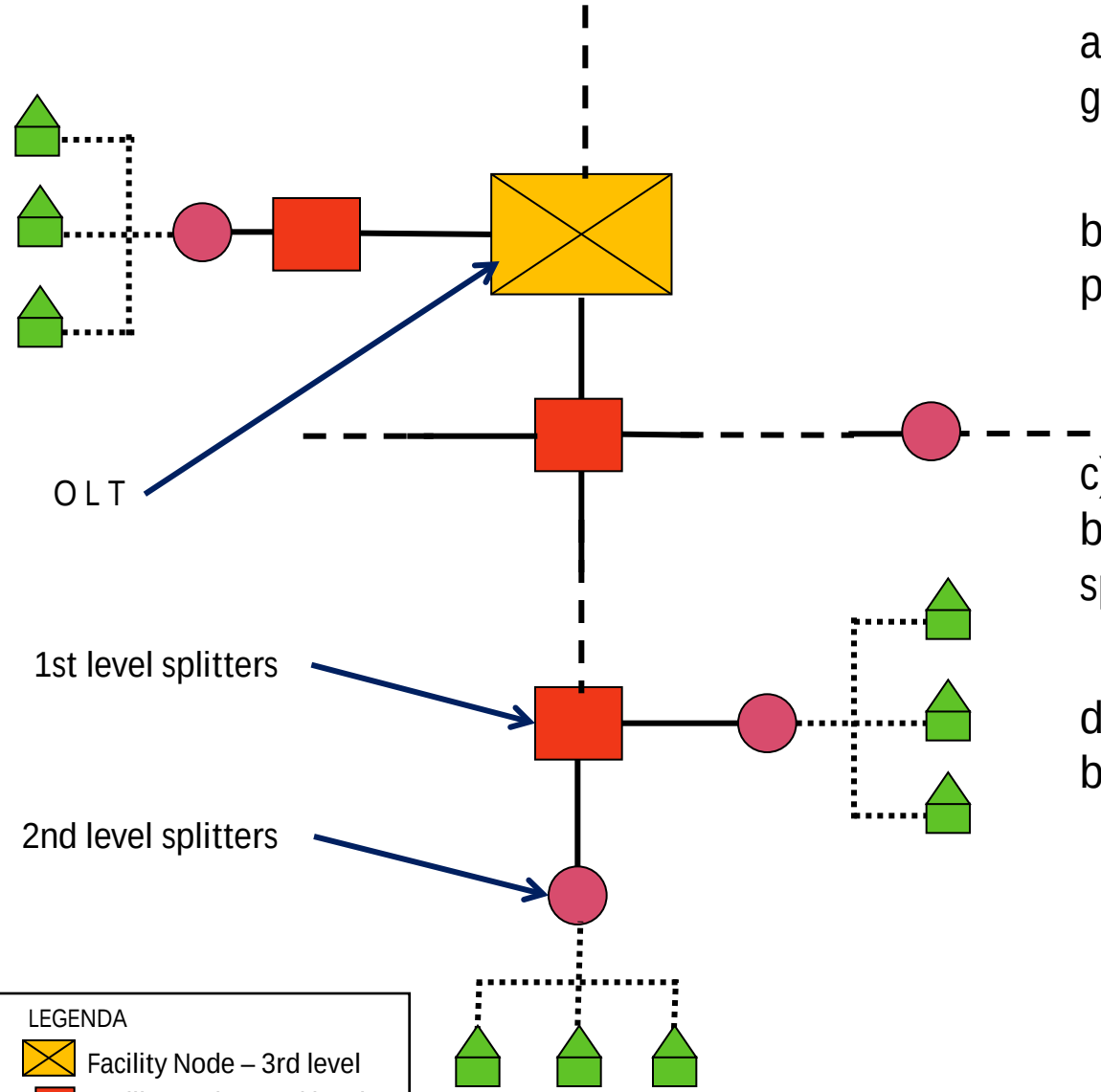
COPEL Telecom

Results on a map



How it works...

Proposed Algorithm – schematic view



a) To plan a PON network, from a group of demands.

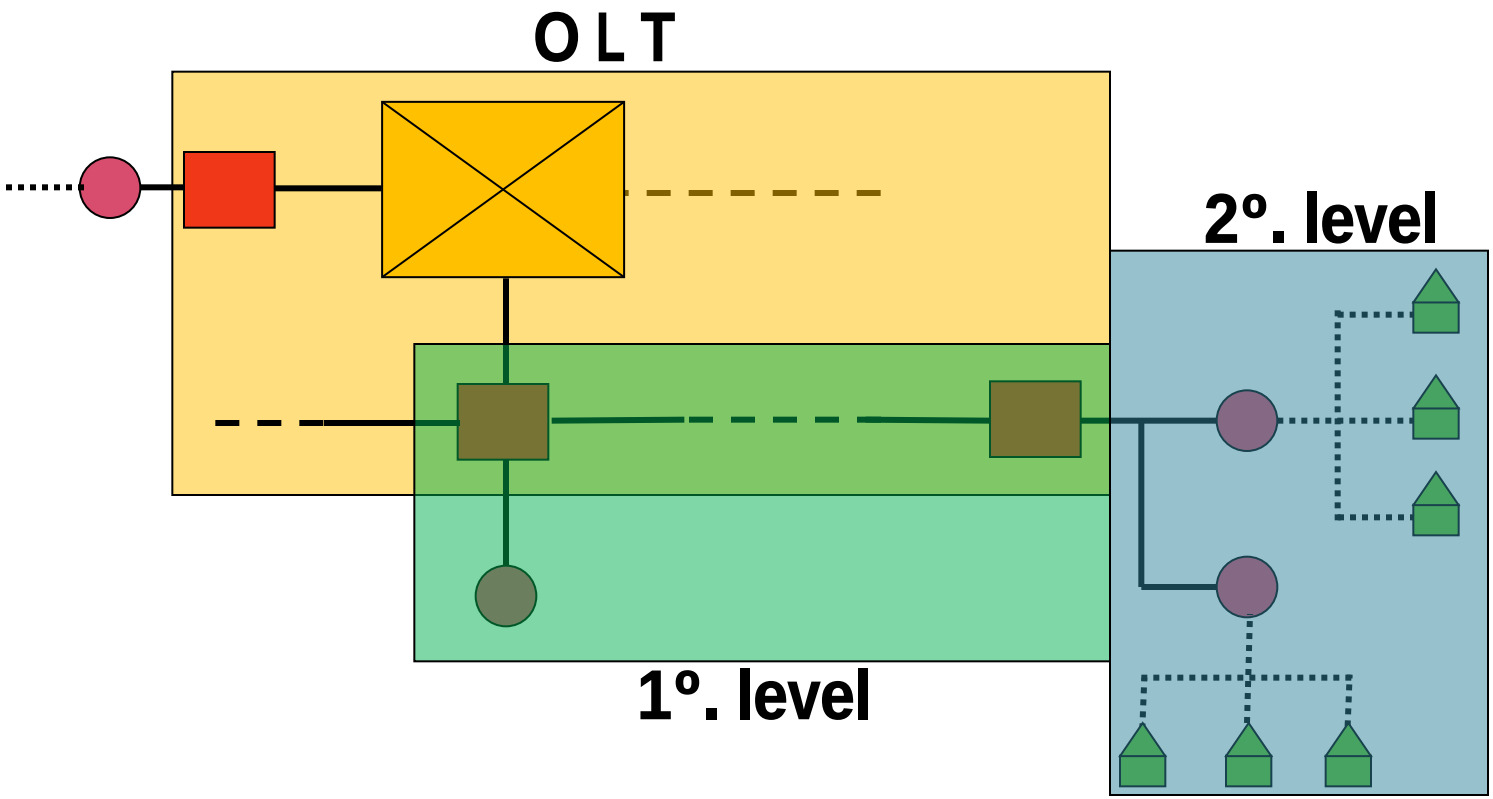
b) To find a ideal quantity and the best place to install the 2nd level splitters.

c) To find the ideal quantity and the best place to install the 1st level splitters.

d) To find the ideal quantity and the best place to install the OLT.

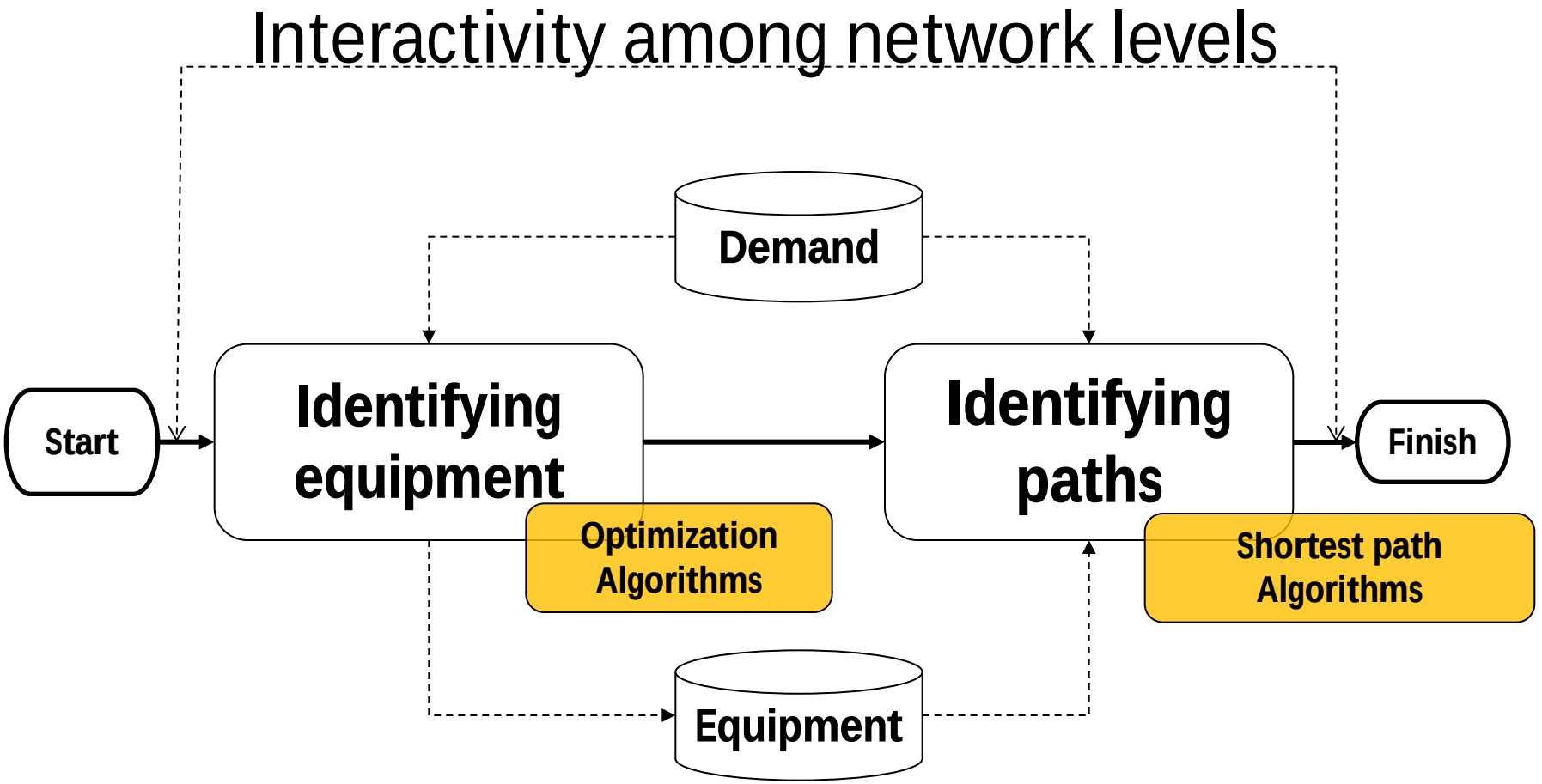
Proposed Algorithm

It is a multiobjective optimization problem, each level of the network is dealt in an individual way, and at the same time it influences the development of the solution for adjacent levels.



MAND

Multilevel Algorithm for Network Design



Discussion / Conclusion

1) Customization of data input interfaces
   a) Standardization in the use of the system for inventory data input;
   b) Integrity of registered data.

2) Project Tools
   a) Single Management of network projects;
   b) Network expansion Management;
   c) Emission of standardized list of materials.

3) R&D
   a) To enhance time in the development of PON network project;
   b) Standardization in the development of new projects;
   To do:
   i) Integrate the analyzed data from algorithms with existent data in the inventory registry, i.e. to consider the existent network;
   ii) Enhance the computational performance of execution of the algorithm in the interactions among levels.

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