



COPEL

Pura Energia



GIS for Inside Plants of Telecommunications

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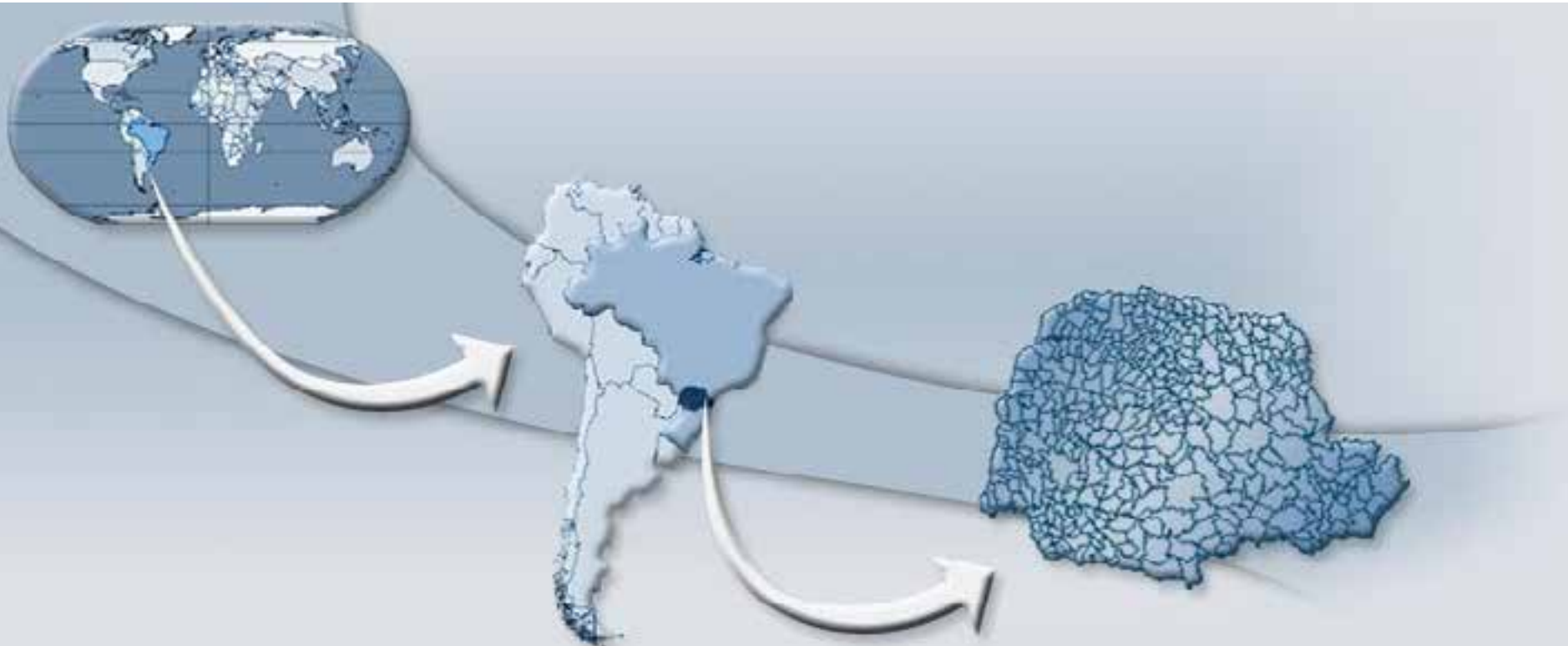
Agenda:

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



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

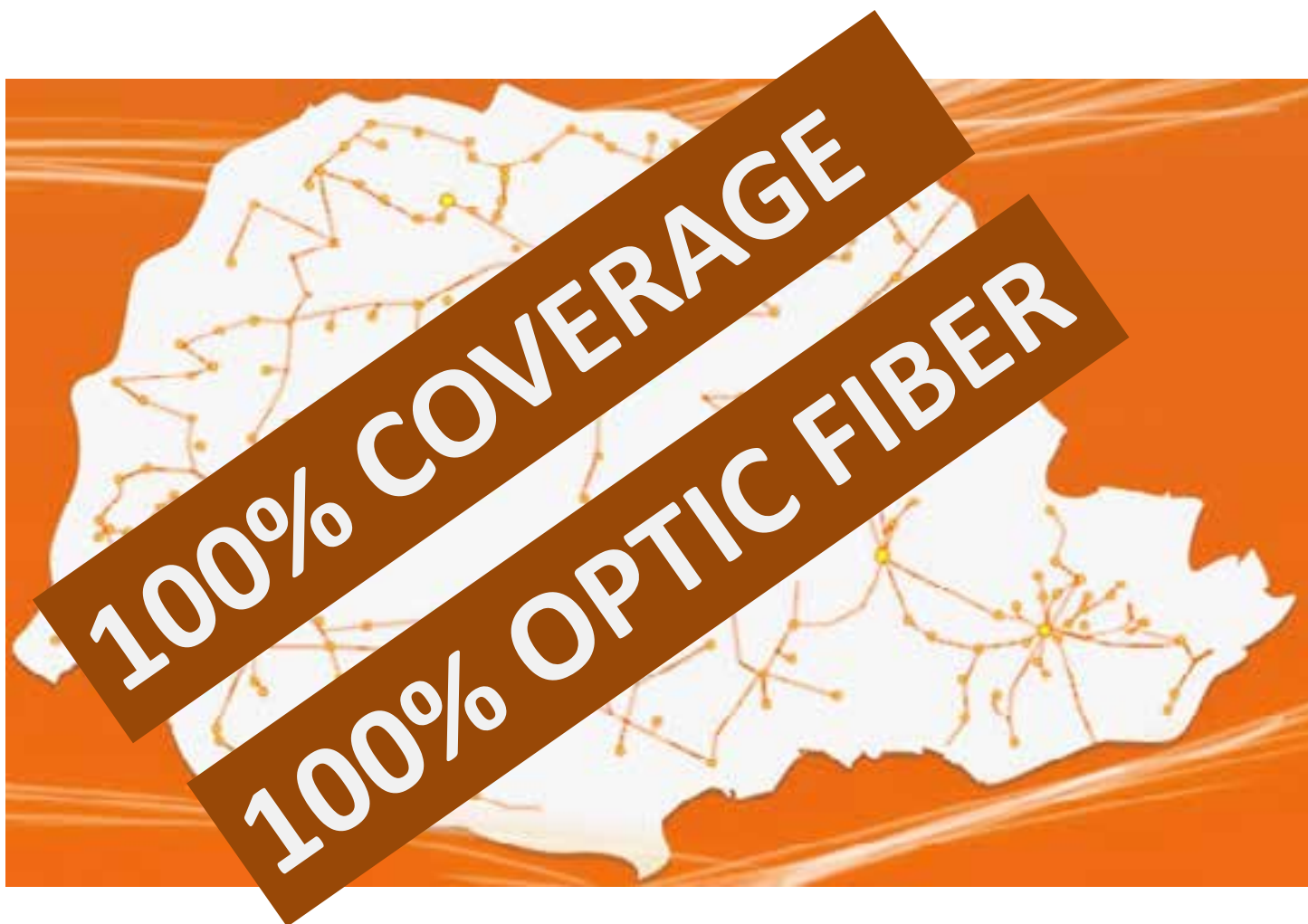
The power transmission system is responsible for operation and maintenance of 32 substations and 2,170 km of lines.



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.



COMPLETE SOLUTIONS



Residential



Small
Companies



Large
Companies



Public
Services



Telecom
Operators



Flexibility



Coverage
Areas



Optic
Fiber



Technology

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

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.

Inventory

Service Assurance

Activation

GIS
Geographic Information Systems

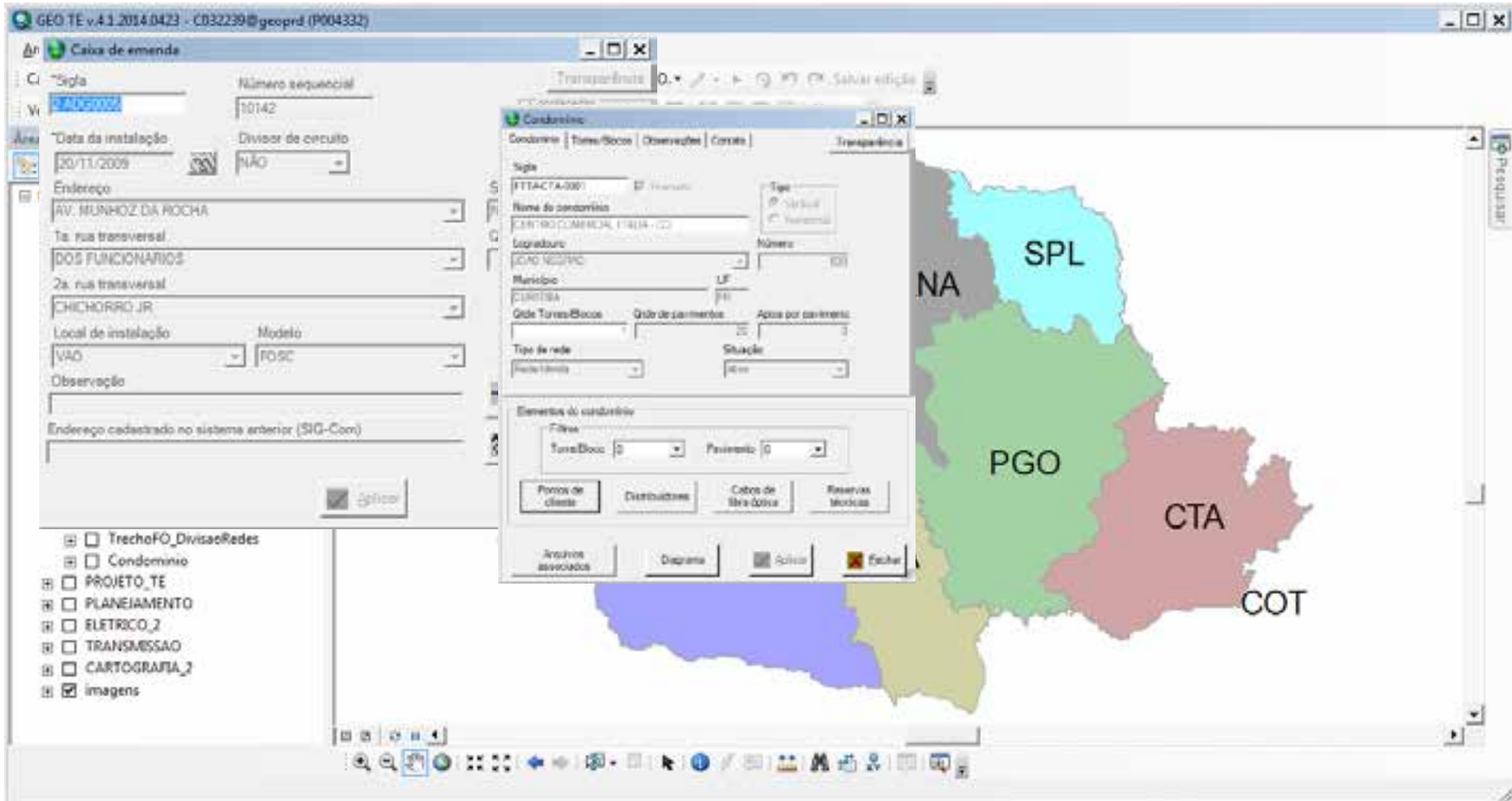
Copel Telecom uses GIS as a tool for:

Ø Inventory

Ø Development of telecommunications network

Ø Support the commercial department

Inventory – “data management”



The screenshot displays the GEO TE v.4.1.2014.0423 software interface, which is used for data management in an inventory system. The interface is divided into several sections:

- Top Bar:** Shows the application title "GEO TE v.4.1.2014.0423 - CD32239@geoprtd (P004332)".
- Left Panel:** Contains a tree view with the following items:
 - TrechoFO_DivisaoRedes
 - Condominio
 - PROJETO_TE
 - PLANEJAMENTO
 - ELETRICO_2
 - TRANSMISSAO
 - CARTOGRAFIA_2
 - imagens
- Main Form (Caixa de emenda):** A data entry form with the following fields:
 - Sigla:** [FTTACTA-000] (Número sequencial: 10142)
 - Data da instalação:** 20/11/2009 (Divisor de circuito: NÃO)
 - Endereço:** AV. MUNHOZ DA ROCHA, DOS FUNCIONARIOS, CHICHORRO JR.
 - Local de instalação:** VAO (Modelo: FOSC)
 - Observação:** [Empty field]
 - Endereço cadastrado no sistema anterior (SIG-Com):** [Empty field]
- Map:** A map showing geographical areas labeled NA, SPL, PGO, CTA, and COT. The SPL area is highlighted in cyan.
- Condominio Window:** A detailed data entry window for the selected area, containing:
 - Condicionio:** FTTACTA-000 (Tipo: Virtual)
 - Nome do condominio:** CENTRO COMERCIAL ITALIA - CO
 - Logradouro:** LEAO NEGRO
 - Município:** CLUSTRA (UF: PI)
 - Glde Torres/Elecos:** [Empty] (Glde de parâmetros: [Empty]) (Após por parâmetros: [Empty])
 - Tipo de rede:** [Empty] (Situação: [Empty])
 - Elementos do condominio:**
 - Filtra: Torres/Elecos [Empty] Pavimento [Empty]
 - Processo de cliente
 - Distribuidor
 - Cabo de fibra ótica
 - Reservas técnicas
 - Buttons:** Analises associadas, Diagrama, Salvar, Fechar

Inventory – “connectivity”

Conectividade

Sigla do núcleo de entrada: 03000 (00-10-00)

Terrapolo: [Selecionar]

Tratador de serviço: [Selecionar]

Data de validação: 01/10/2014

Profissional responsável pela tarefa de fibra: [Selecionar]

Legenda:

- Verde: OK
- Amarelo: Atenção
- Vermelho: Erro
- Cinza: Não informado

Sigla do cabo A	Sequência	Fibra A	Strada do splitter	Saída do splitter	Sigla do cabo B	Sequência	Fibra B	Observação	Tipos
CEM78002	0002	001	0	0	CEM78002	0002	001	Adoconada	Não
CEM78002	0002	010	0	0	CEM78002	0003	010	Adoconada	Não
CEM78002	0002	011	0	0	CEM78002	0003	011	Adoconada	Não
CEM78002	0002	012	0	0	CEM78002	0003	012	Adoconada	Não
CEM78002	0002	013	0	0	CEM78002	0003	013	Adoconada	Não
CEM78002	0002	014	0	0	CEM78002	0003	014	Adoconada	Não
CEM78002	0002	015	0	0	CEM78002	0003	015	Adoconada	Não
CEM78002	0002	016	0	0	CEM78002	0003	016	Adoconada	Não
CEM78002	0002	017	0	0	CEM78002	0003	017	Adoconada	Não
CEM78002	0002	018	0	0	CEM78002	0003	018	Adoconada	Não
CEM78002	0002	019	0	0	CEM78002	0003	019	Adoconada	Não
CEM78002	0002	020	0	0	CEM78002	0003	020	Adoconada	Não
CEM78002	0002	021	0	0	CEM78002	0003	021	Adoconada	Não
CEM78002	0002	022	0	0	CEM78002	0003	022	Adoconada	Não

De campos obrigatórios não marcados com *



Conexões de fibra óptica
Diagrama Unifiber v1.0
COPEL TELECOMUNICAÇÕES

Project management

Versionamento de projetos de telecomunicações

Identificação do projeto: 2538 Nível: 1

Descrição: TUR - EMATER

Profissional responsável: JONATAS ROZENDO DOS SANTOS Registro: 51707

Data de criação: 15/8/2013 9:32:1E Última alteração: 12/3/2014 9:19:3 Situação: Projeto

1063 projetos versionados. Desenhar polígono Aplicar Fechar

Projetos versionados

- CTE
 - SCL
 - CTLC
 - PTLGVA
 - SVATGV
 - JONATAS ROZENDO DOS SANTOS
 - 2538
 - 2582
 - 2598
 - PTLPGO
 - CTLO
 - PTLPOT
 - DMDT
- SNL
- DDI*
- HSNI

- Ativar projeto
- Concluir projeto
- Apagar projeto
- Pesquisar projeto
- Retornar ao cadastro
- Listar projetos da área
- Relação de materiais**
- Atualizar dados
- Expandir nós
- Ir para área do projeto

- Emitir relação de materiais
- Emitir relação com log de processamento
- Emitir relação de todos os projetos descendentes**
- Elementos afetados no projeto

ListaMateriais_2538.csv - Microsoft Excel

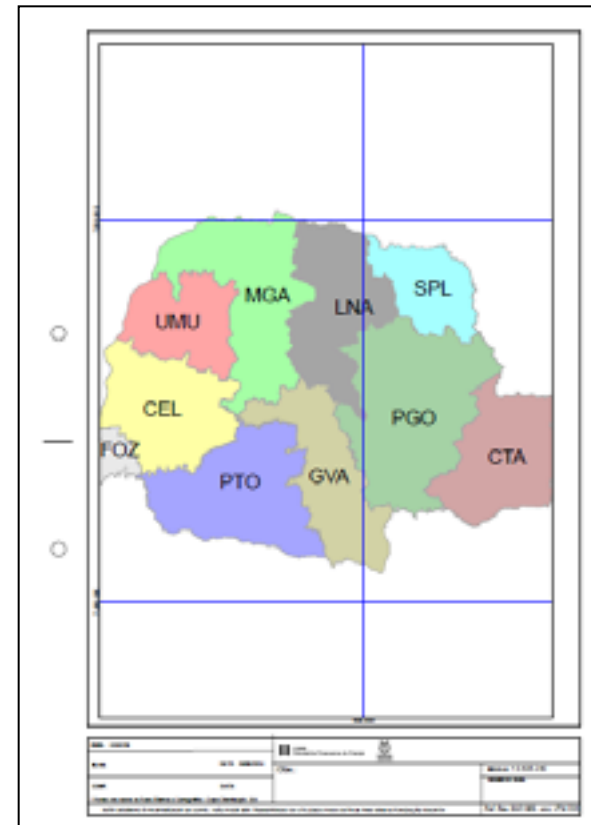
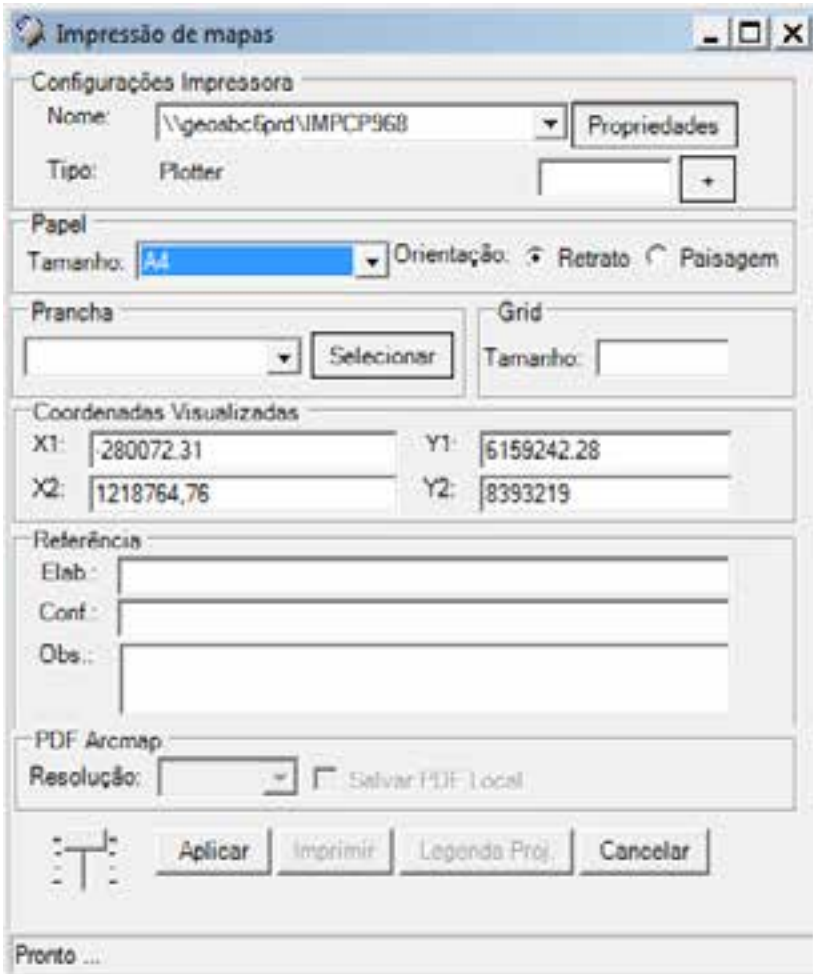
Item	Código	Descrição	Unidade	Previsto	Entregue	Realizado
1	15011219	ANCORAGEM, CABO OPTICO, D=11,0A 16,0MM	UN	12	0	0
2	15011593	PIO, ESPINAR, ACO, SOL, DIAM. 1,25MM, TELEB	ROL	129	0	0
3	20007143	CORDONALHA, DITI, D=6,MM, C/7FIOS ARAMIDA	M	32	0	0

We use GIS for business support in:

- Ø Researches of new markets
- Ø Analyses of new client's viability

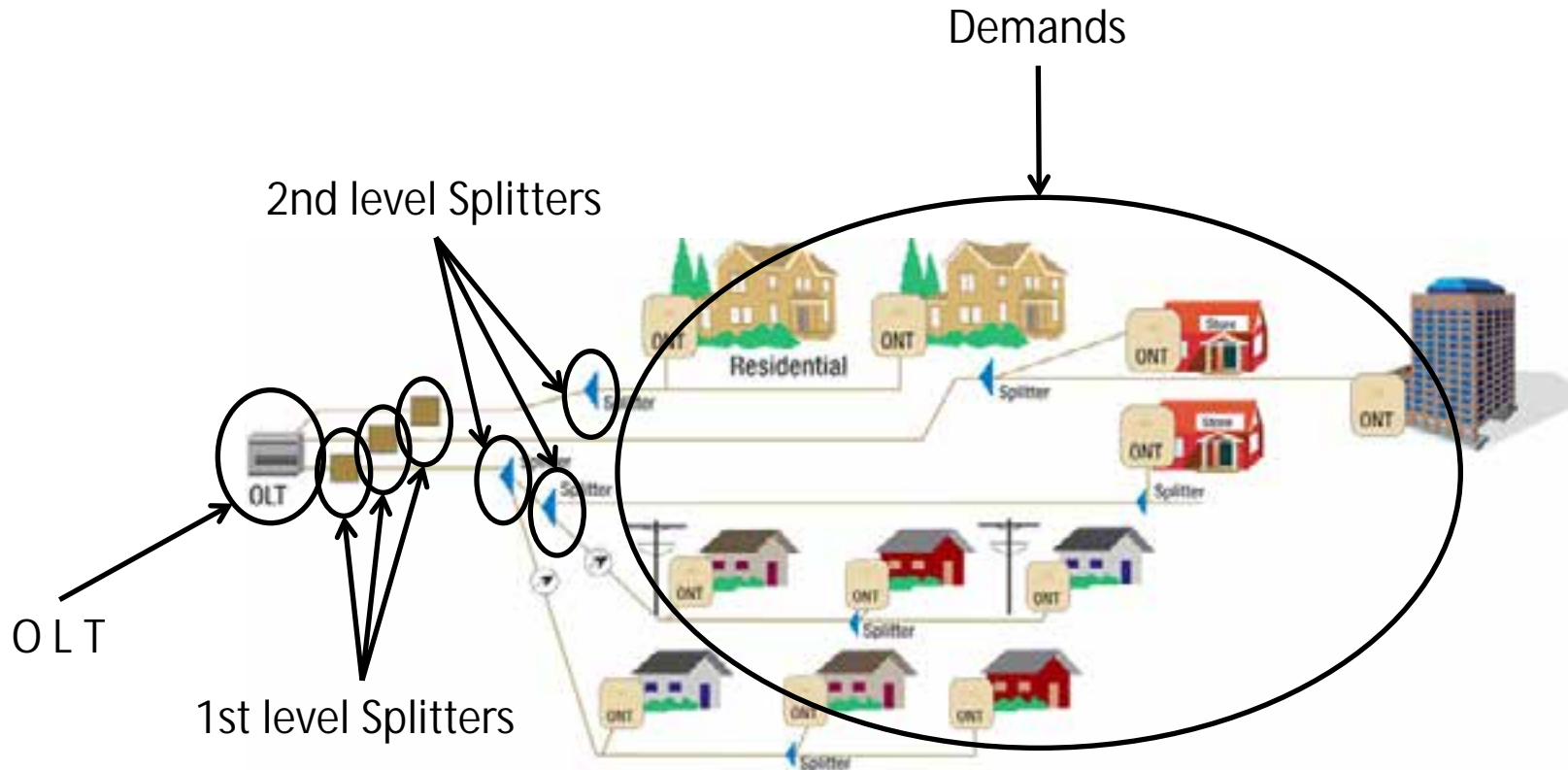
Printing

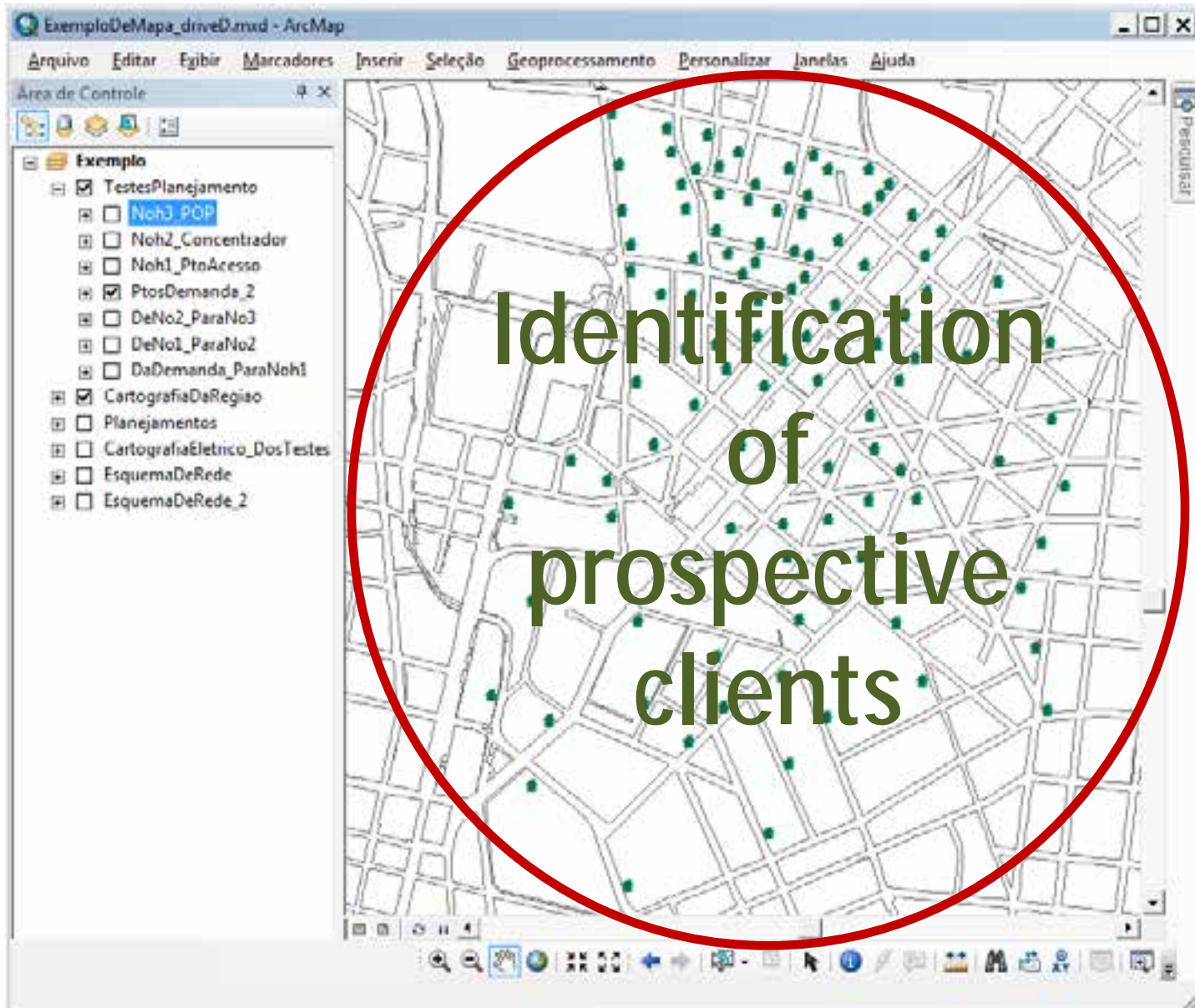
The printing was customized, with the definition of “templates”, in order to meet the company’s standards.

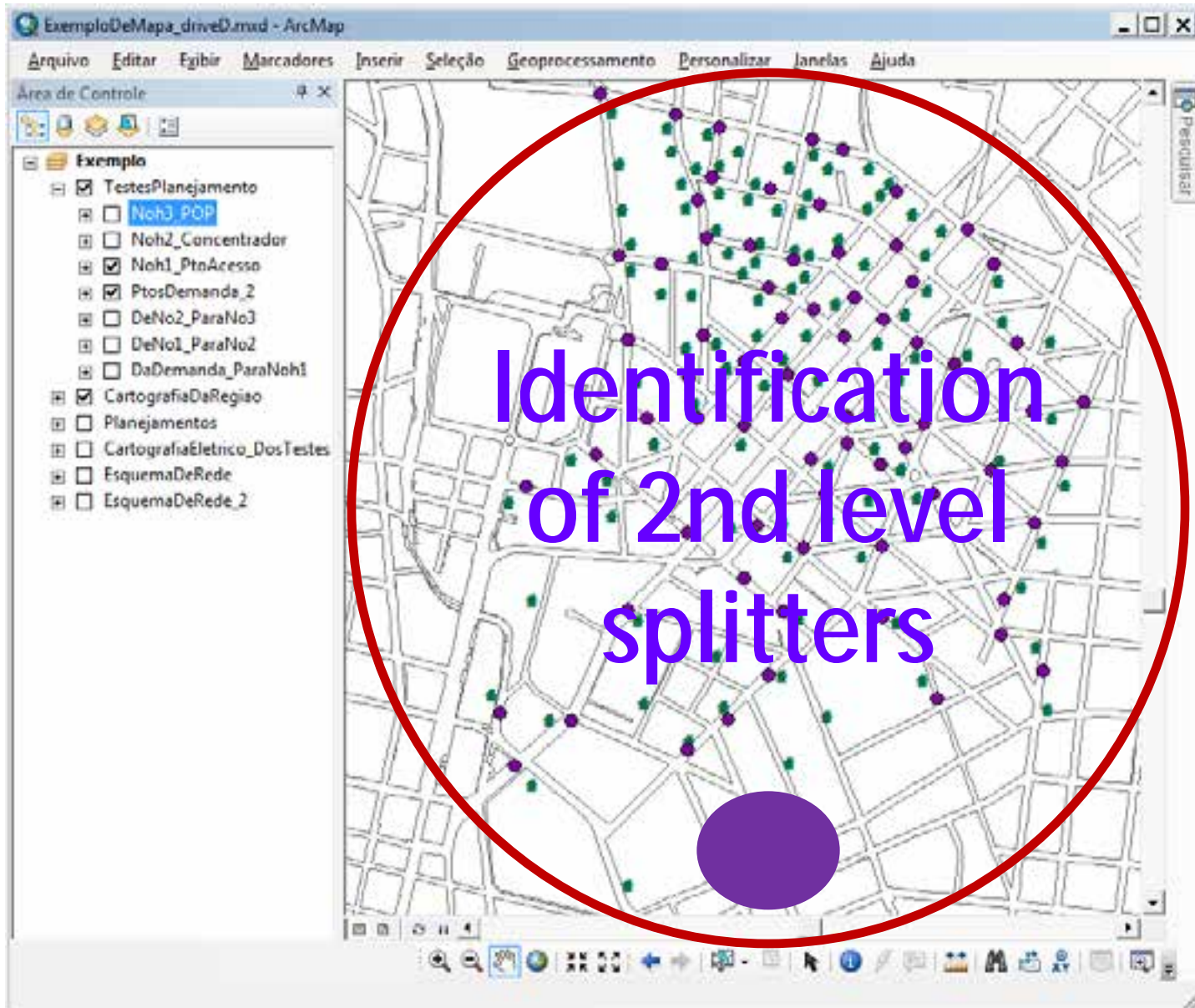


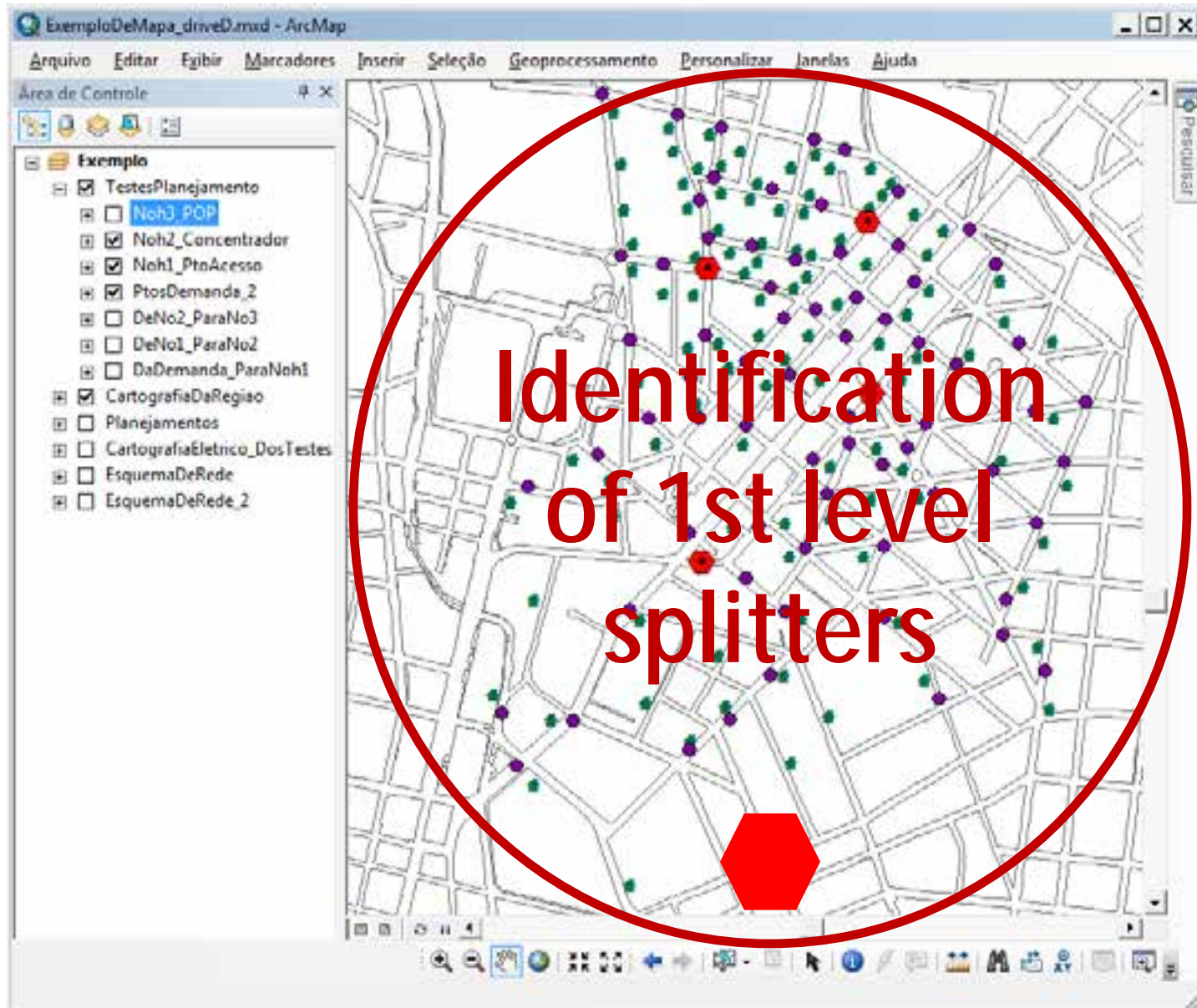
Project Design

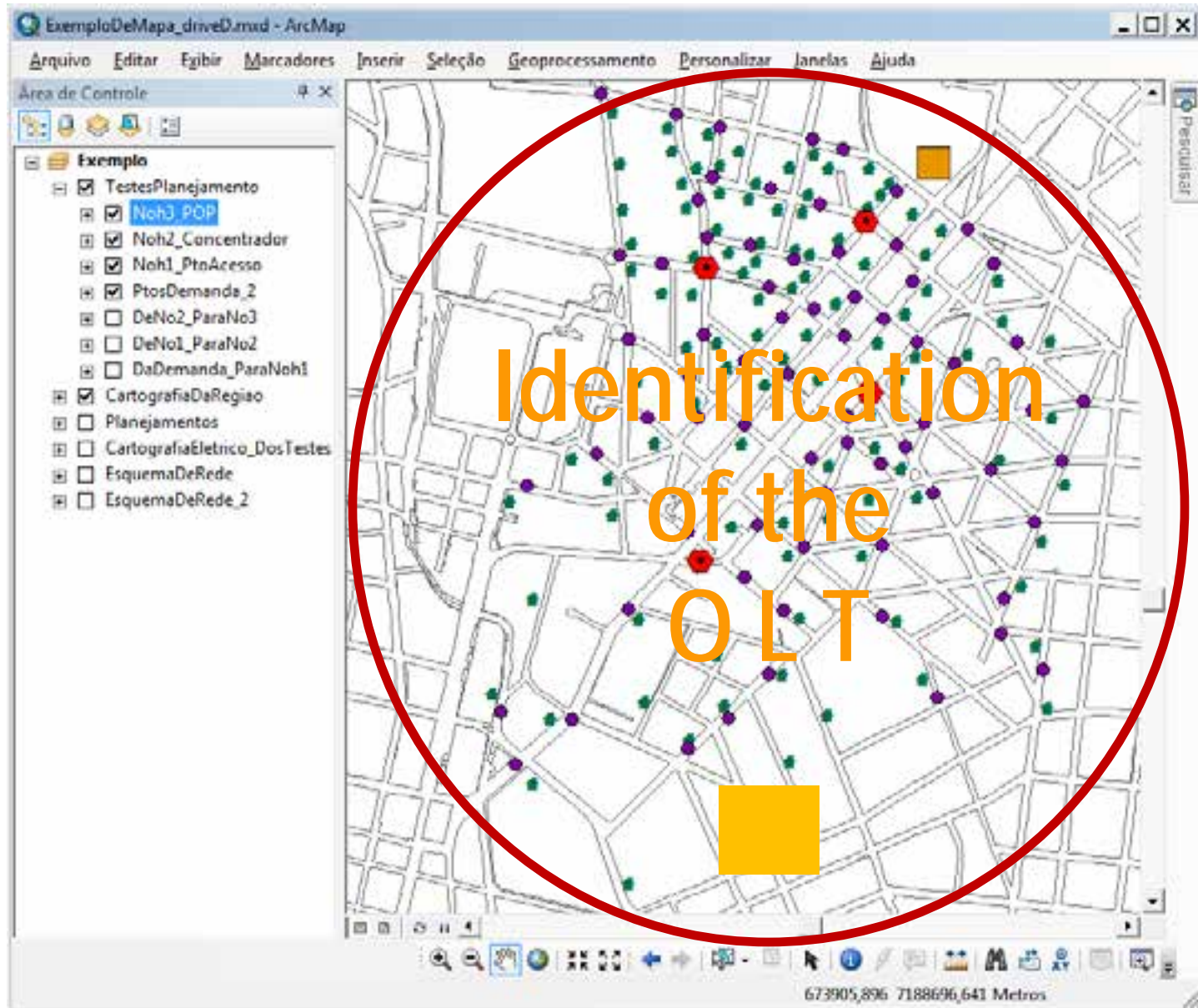
R&D – Research and experimental development





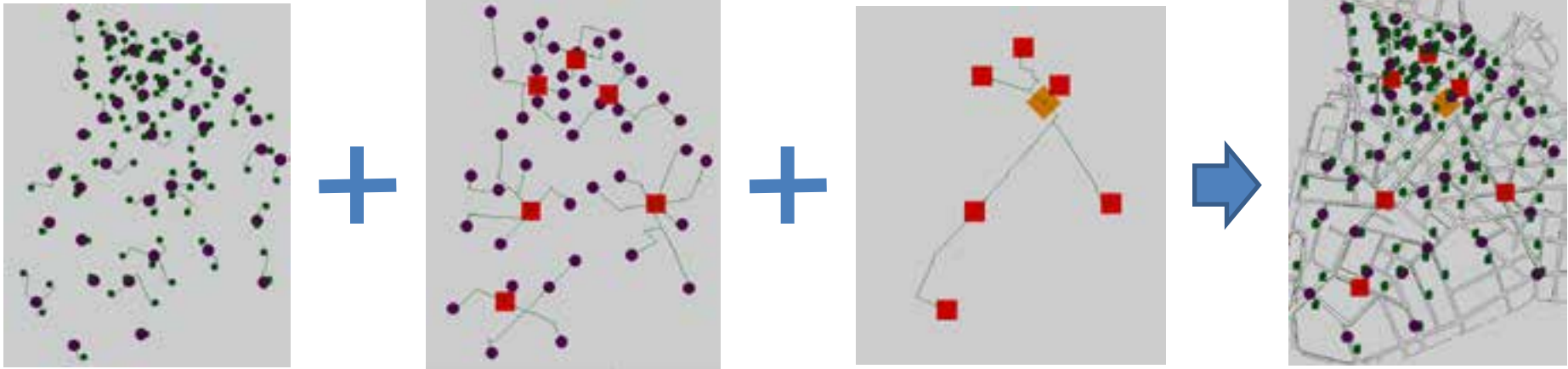


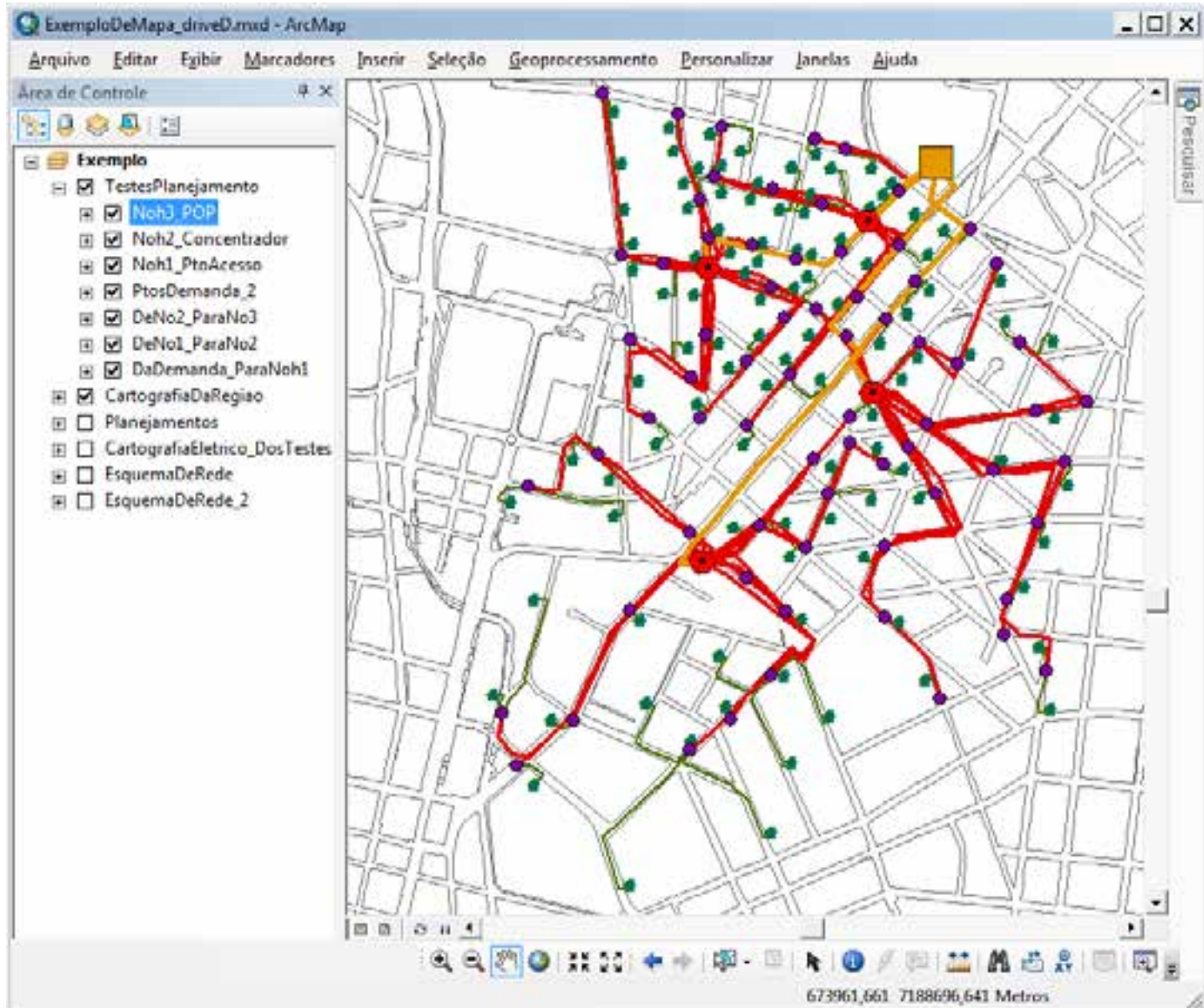




Results

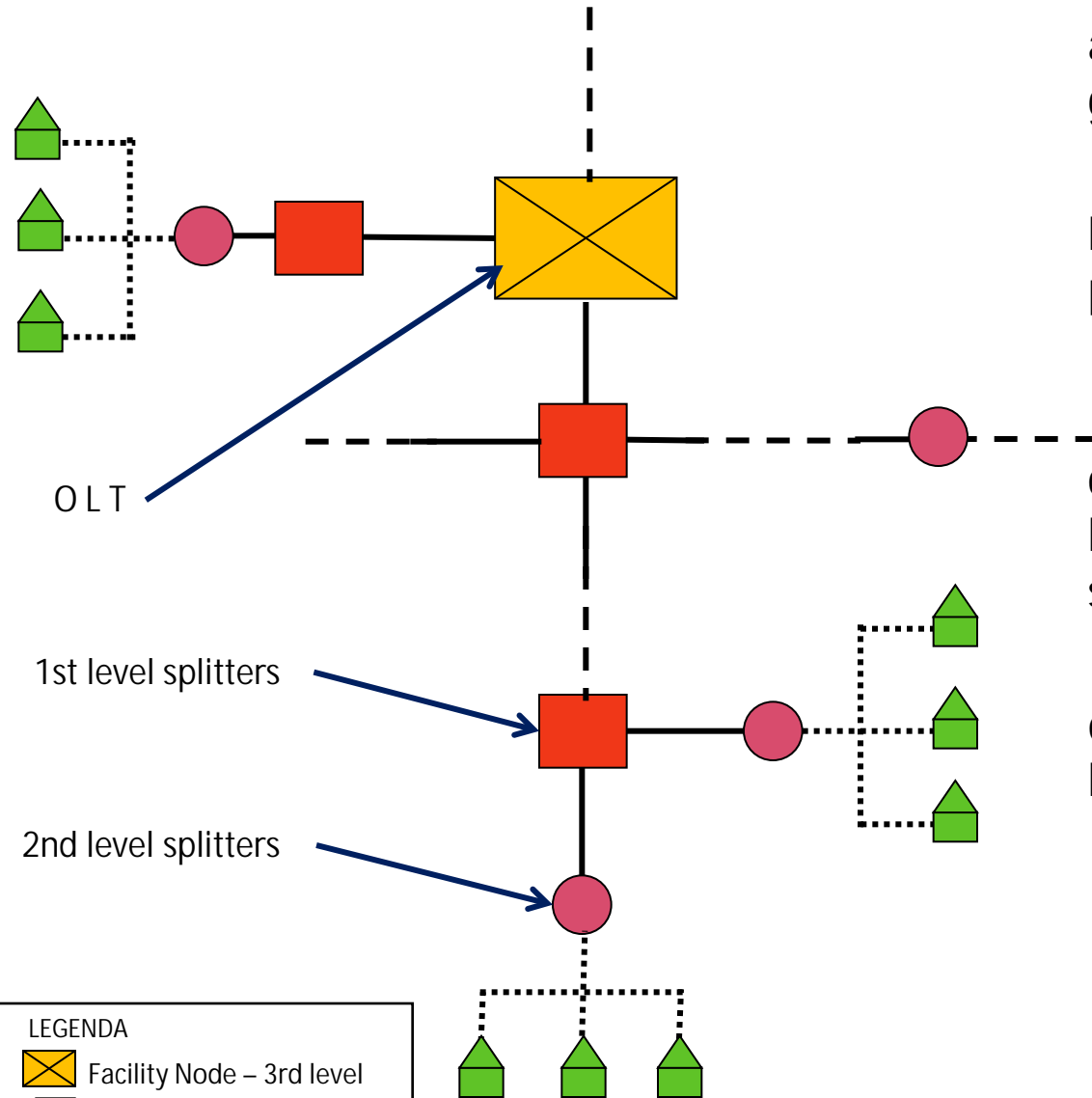
A network planning with spatial definition of the necessary equipment installation.





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.

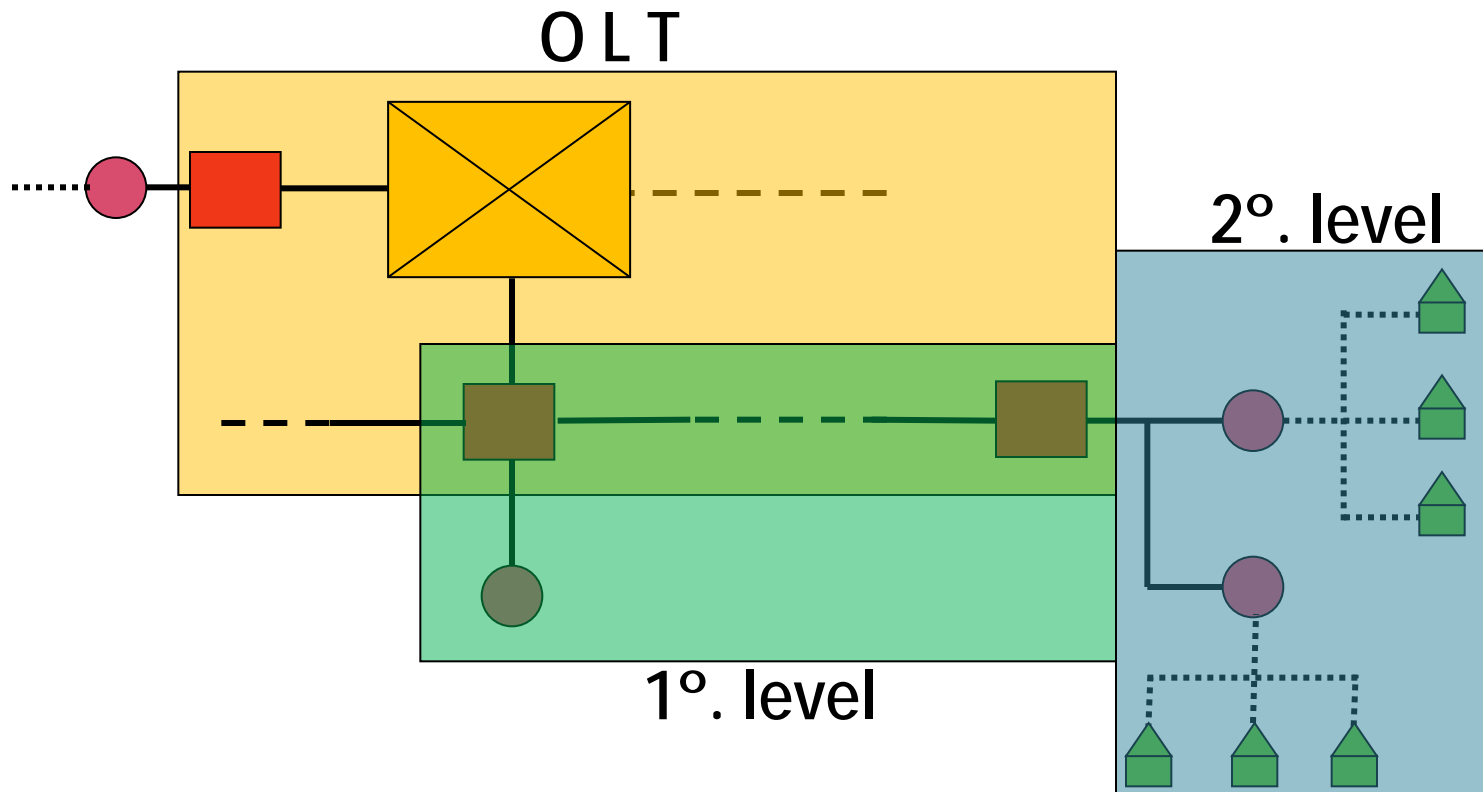
c) To find the ideal quantity and the best place to install the 1st level splitters.

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

LEGENDA

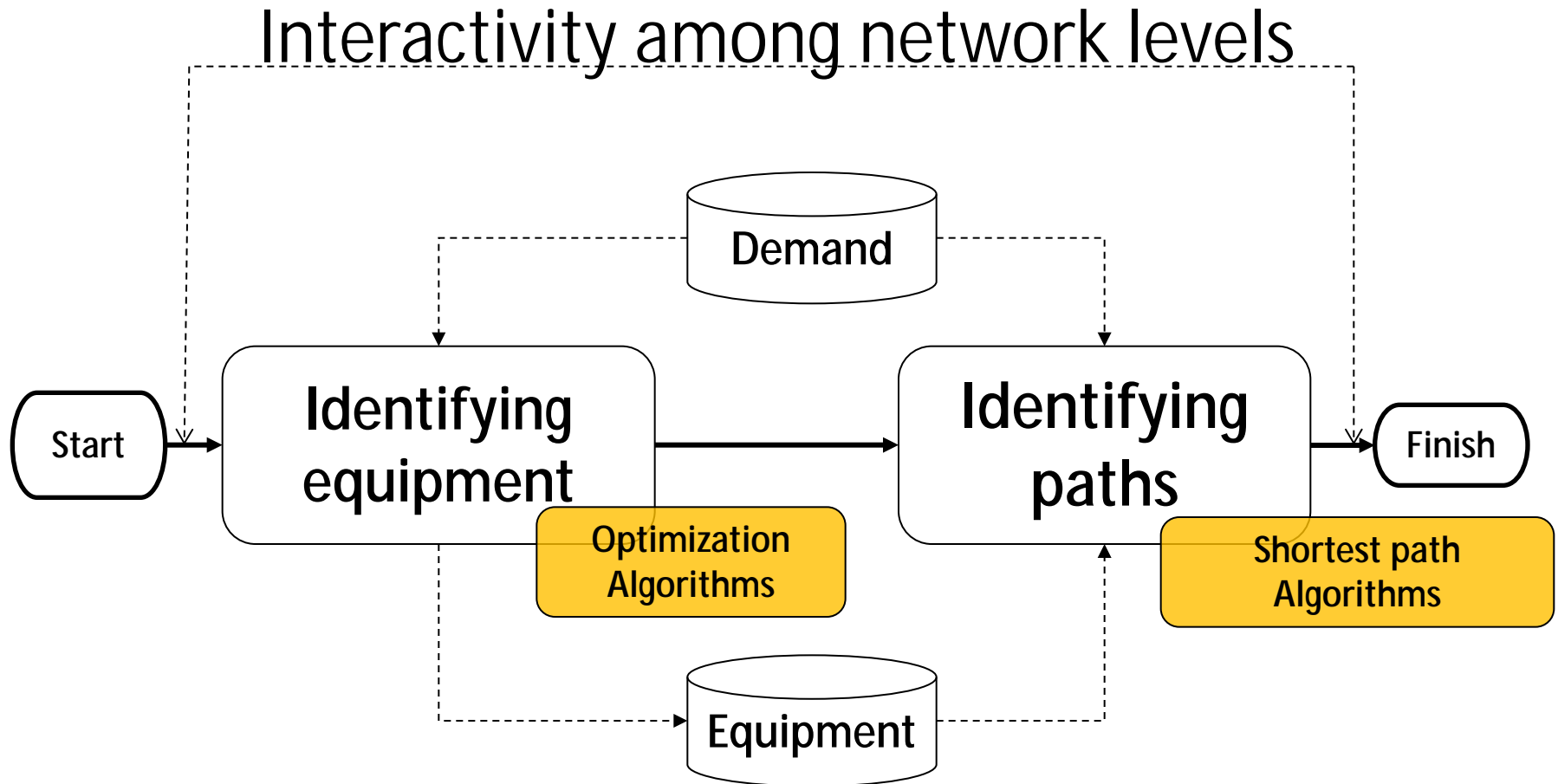
-  Facility Node – 3rd level
-  Facility Node – 2nd level
-  Facility Node – 1st level
-  Demand Node

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



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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