

# **Grid Edge Technologies: Changing Paradigms to Promote the 3D Concept**

Decentralization, Decarbonization, and Digitalization

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# CICLO DE DEBATES

## FUTURO DOS SISTEMAS DE DISTRIBUIÇÃO

A Agência Nacional de Energia Elétrica tem a honra de convidar os funcionários dessa Distribuidora para o evento **Ciclo de Debates: Futuro dos sistemas de distribuição**.

As palestras serão ministradas pelo professor titular da UNICAMP Doutor Walmir Freitas, virtualmente, pelo aplicativo *Microsoft Teams* ([Clique para ingressar na reunião](#)), entre agosto e dezembro de 2022, conforme cronograma a seguir.

Uma excelente oportunidade de compartilharmos conhecimentos sobre os rumos da distribuição de energia elétrica no Brasil e no mundo.

Participe. É gratuito e sem necessidade de inscrição.

## CRONOGRAMA DO CICLO DE PALESTRAS

**29 DE AGOSTO | 14h às 16h**

**Tema:** Gestão de perdas técnicas: modelos e ferramentas (DSS Extensions)

**26 DE SETEMBRO | 14h às 16h**

**Tema:** A living lab for integration of emerging technologies into distribution systems of the future: A CPFL-UNICAMP Collaboration.

**17 DE OUTUBRO | 14h às 16h**

**Tema:** Controle de tensão e compensação de potência reativa em redes com elevada penetração de microgeração.

**21 DE NOVEMBRO | 14h às 16h**

**Tema:** Grid-edge technologies: changing the paradigms to promote the 3D concept.

**5 DE DEZEMBRO | 14h às 16h**

**Tema:** Power quality data analytics: a new world of applications.

# Grid-edge technologies: definitions and contextualization

**Greentech Media:** *The grid edge comprises the **technologies, solutions and business models** advancing the transition toward a **decentralized and distributed** grid structure.*

**World Economic Forum:** *Three trends of the grid edge transformation: **electrification, decentralization and digitalization.***

**ABB:** *An ecosystem of **distributed energy capabilities, digital solution and services** to maximize customer value and retention.*

**3D Concept**  
**Decentralization**  
**Decarbonization**  
**Digitalization**

**Siemens:** *Grid edge is where the **consumer, prosumer and the intelligent grid** interact. This transition is driven by **digitalization, decentralization and a global call for decarbonization.***

**IEEE:** *Grid edge is one of the **most exciting emerging technology transitions...** It will connect utilities, technology providers, policymakers, and key stakeholders worldwide to advance a **clean energy** future while preserving the grid's **reliability and affordability...***

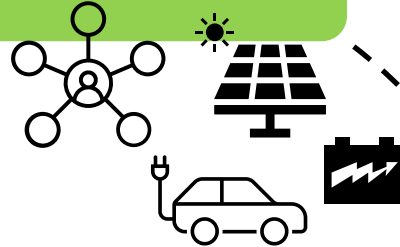
# Tendencies: Grid-edge technologies (3D concept)

✓ **Business model:**  
from SERVICES to MULTIPLATFORM

✓ **New regulatory framework**

**NEW**

**Decentralization**



**Key technologies/solutions:**

- ✓ Distributed energy resources
- ✓ Demand response
- ✓ Microgrids
- ✓ Transactive energy

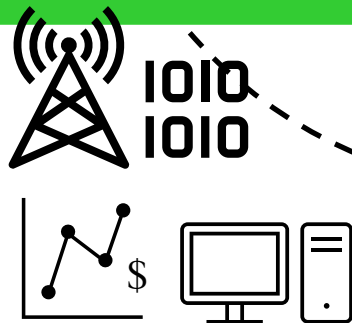
**Key players:**

- ✓ Adaptive prosumers (active customers)
- ✓ Third-party integrators/service suppliers (nonregulated)

**Key technologies/solutions:**

- ✓ Smart meter
- ✓ Communication/computing (IoT)
- ✓ Automation, supervision, protection, and control
- ✓ Energy market

**Digitalization**

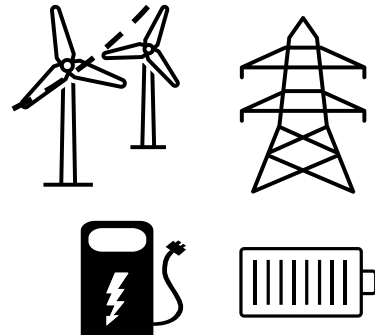


**Key players:**

- ✓ Third-party integrators/service suppliers
- ✓ Software and solution developers

## 3D Concept

**Decarbonization (Electrification)**



**Key technologies/solutions:**

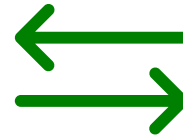
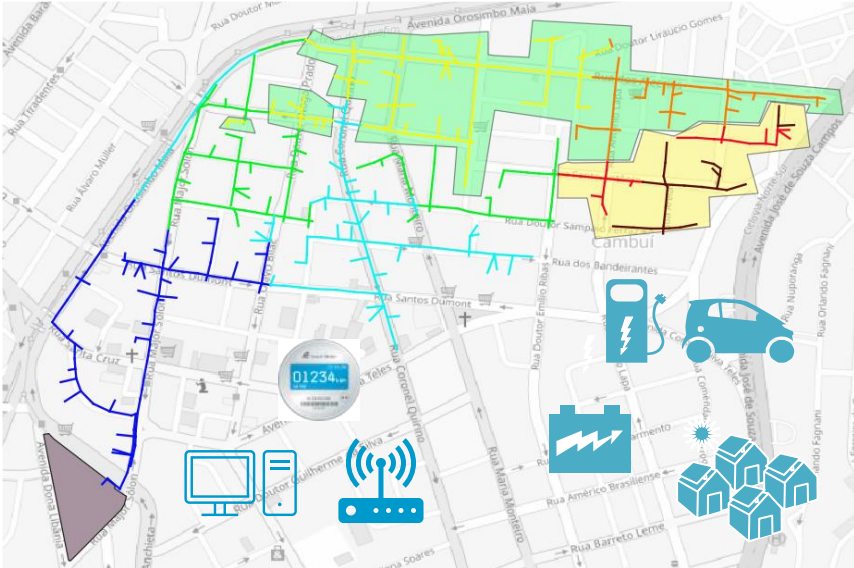
- ✓ Electric mobility
- ✓ Electric heating/cooling systems
- ✓ Energy efficiency
- ✓ Renewable generators

**Key players:**

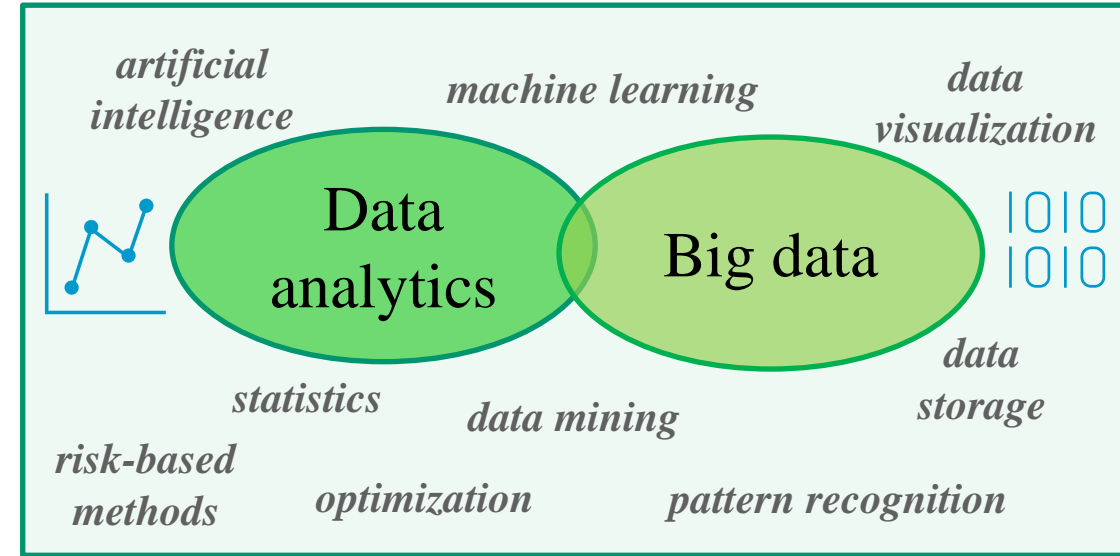
- ✓ Third-party integrators/service suppliers
- ✓ Independent Producers
- ✓ Utilities

# Tendencies: Grid-edge technologies – distribution systems

## Active, supervised distribution systems (grid-edge technologies)



## Data Science



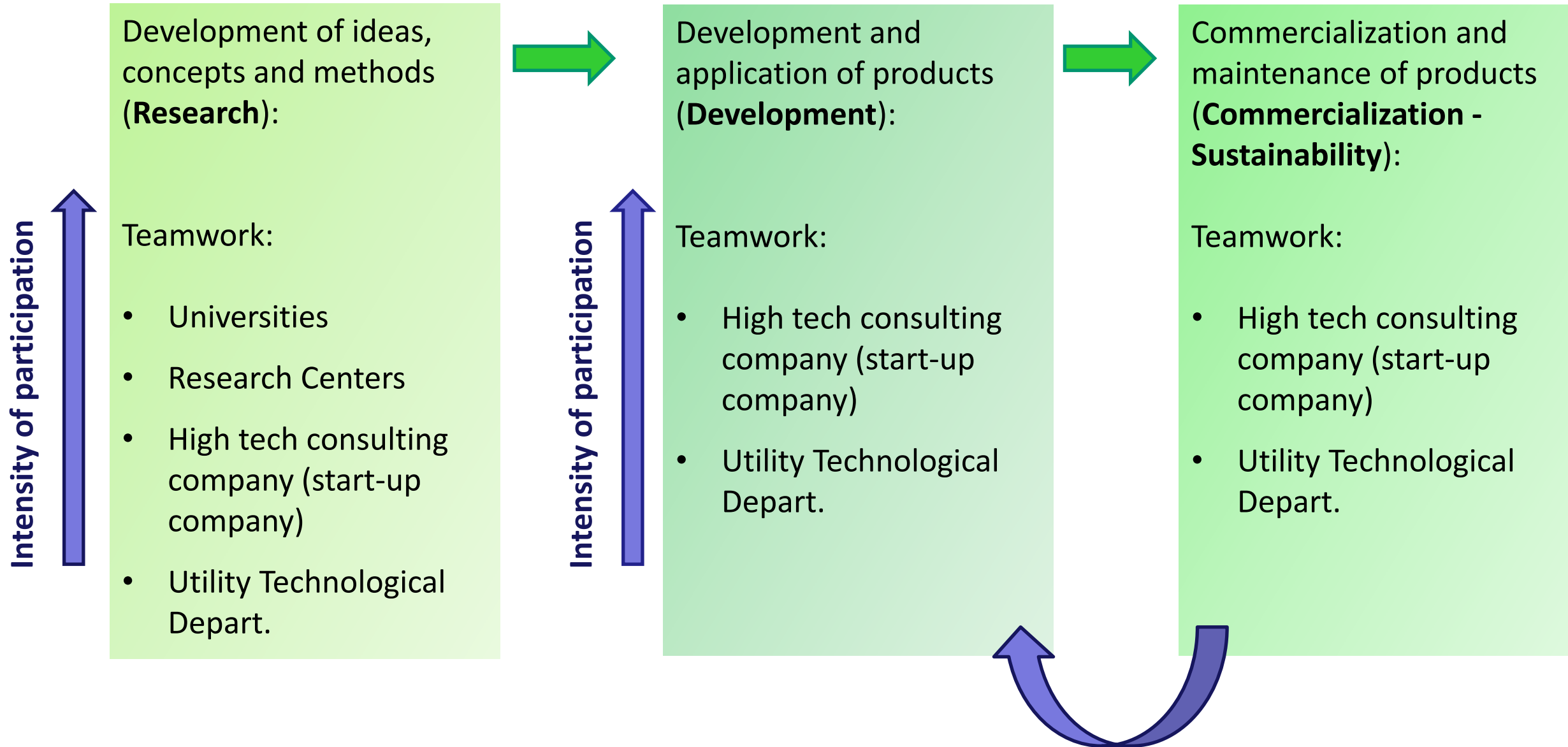
## Potential data sources

## Potential applications

- Active risk-based asset management
- Proactive protection and control
- Active system/equipment condition monitoring
- New services, business, and market models

- AMI (**smart meters**)/SCADA
- PQ and waveform measurement units
- GIS database
- Commercial database
- Weather stations
- Demographic/economic database

# R&D: Sustainability – from research to commercialization



Thank you

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