From Catching Up to the Technological Frontier - Challenges for Knowledge Governance

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Overview

1. **Theoretical and Framework Inspirations**

   Catching up and Leapfrogging processes - Aggiornamento

   Knowledge Networks and Markets (KNM) - Governance

2. **EMBRAPA Collaborative Knowledge Platforms**

(i)) Brazilian Consortium for Research and Development of Coffee (CBP&D/Café or Consórcio Café)

(ii) Embrapa Soja and Genosoja

(iii) Embrapa Agroenergia and Ridesa

3. **Concluding remarks**

Theoretical and Conceptual Afflatus

- There is no single technological pathway
- Different starting points, investments, vocations, capabilities, and so on => catching up with what?
- Science, Technology and Innovation for Sustainable Development
- Three dimensions: economic, environmental, social
- Science shift => huge impact on knowledge governance
- Open innovation, user innovation and knowledge networks and markets => need to be updated to align with catching up and leapfrogging processes.
- Technological frontier less than an end-point or even a moving target, but rather a fluid area or a horizon to be explored.
- The need of different forms of public governance: knowledge governance.

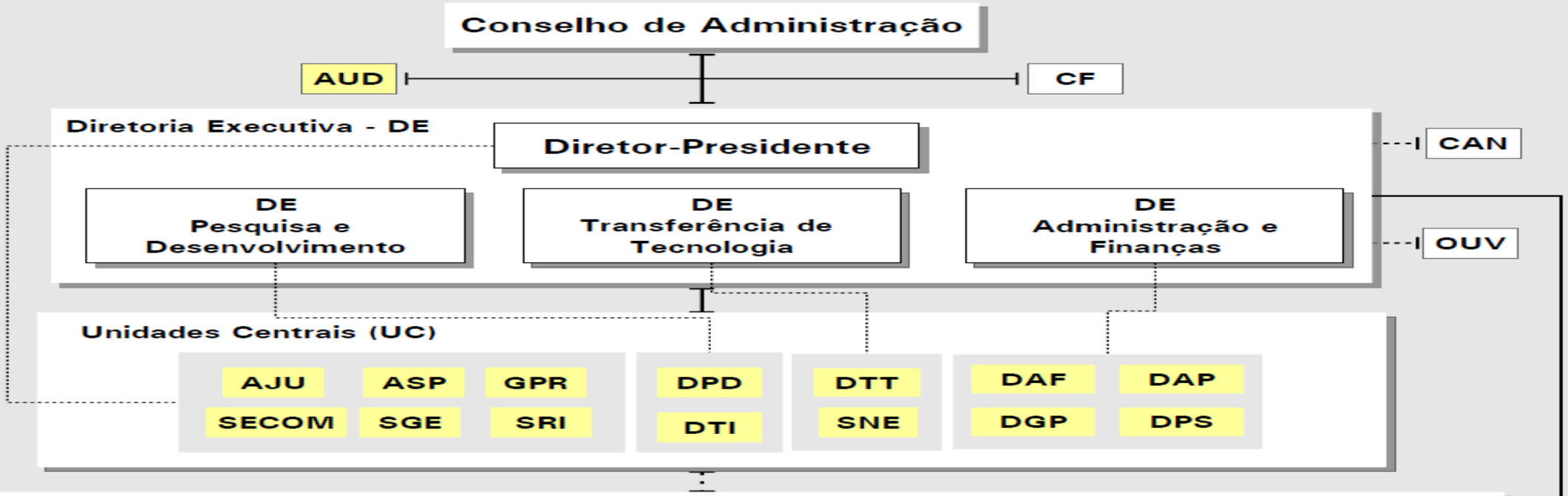
Embrapa

- Collaborative platforms for agriculture research: coffee, soybean, sugar cane.

- Develop own technology suitable to countries' conditions (soil, climate, diseases, etc.) which are key to successful outcomes.

- This strategy may result in entire new segments within the international technological frontier.

Organograma da Embrapa

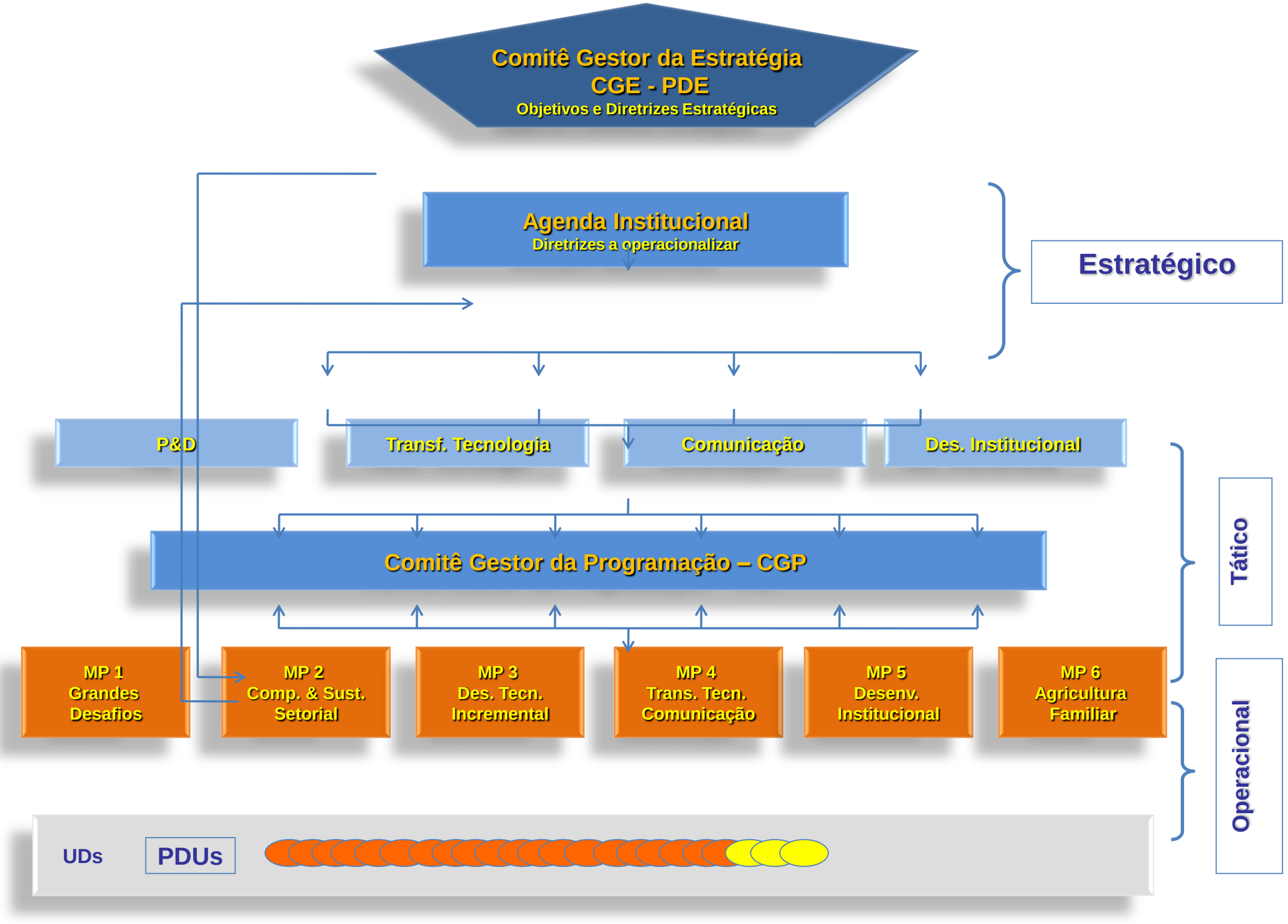


Unidades Descentralizadas (UD)

- Embrapa Acre
- Embrapa Agropecuária Oeste
- Embrapa Agrossilvipastoril
- Embrapa Amapá
- Embrapa Amazônia Ocidental
- Embrapa Amazônia Oriental
- Embrapa Cerrados
- Embrapa Clima Temperado
- Embrapa Cocais
- Embrapa Meio-Norte
- Embrapa Pantanal
- Embrapa Pecuária Sudeste
- Embrapa Pecuária Sul
- Embrapa Rondônia
- Embrapa Roraima
- Embrapa Semiárido
- Embrapa Tabuleiros Costeiros
- Embrapa Algodão
- Embrapa Arroz e Feijão
- Embrapa Caprinos e Ovinos
- Embrapa Florestas
- Embrapa Gado de Corte
- Embrapa Gado de Leite
- Embrapa Hortaliças
- Embrapa Mandioca e Fruticultura
- Embrapa Milho e Sorgo
- Embrapa Pesca e Aquicultura
- Embrapa Soja
- Embrapa Suínos e Aves
- Embrapa Trigo
- Embrapa Uva e Vinho
- Embrapa Agrobiologia
- Embrapa Agroenergia
- Embrapa Agroindústria de Alimentos
- Embrapa Agroindústria Tropical
- Embrapa Estudos e Capacitação
- Embrapa Informática Agropecuária
- Embrapa Instrumentação
- Embrapa Meio Ambiente
- Embrapa Monitoramento por Satélite
- Embrapa Recursos Genéticos e Biotecnologia
- Embrapa Solos
- Embrapa Café
- Embrapa Gestão Territorial
- Embrapa Informação Tecnológica
- Embrapa Produtos e Mercado
- Embrapa Quarentena Vegetal

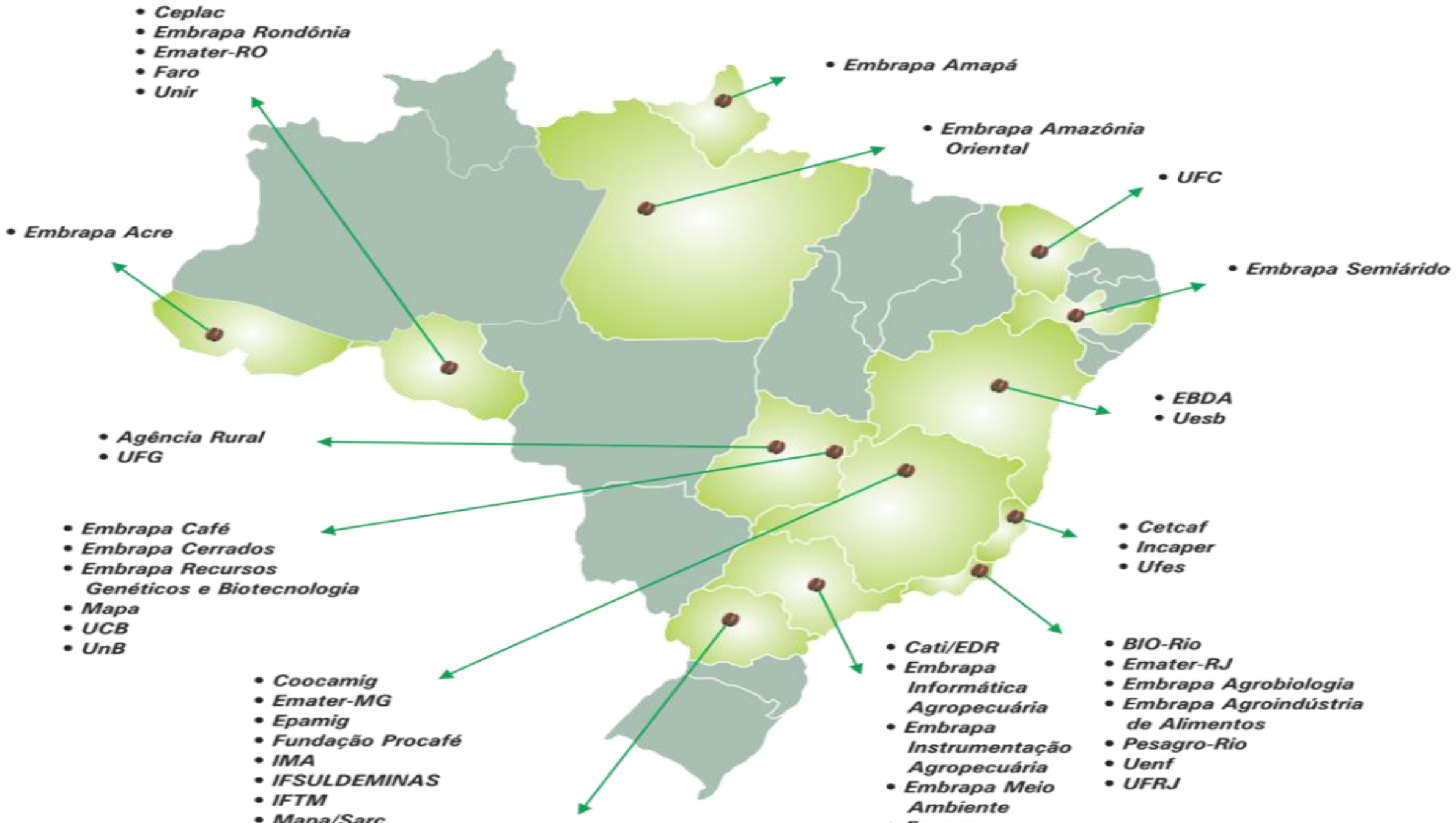
Unidades Centrais | Unidades Ecorregionais | Unidades de Produtos | Unidades de Temas Básicos | Unidades de Serviço

Legenda : CF - Conselho Fiscal | AUD – Assessoria de Auditoria Interna | CAN - Conselho Assessor Nacional | OUV - Ouvidoria | AJU – Assessoria Jurídica | ASP - Assessoria Parlamentar | GPR- Gabinete do Diretor–Presidente | SECOM – Secretaria de Comunicação | SGE – Secretaria de Gestão Estratégica | SNE – Secretaria de Negócios | SRI - Secretaria de Relações Internacionais | DTT - Departamento de Transferência de Tecnologia | DAF - Departamento de Administração Financeira | DAP - Departamento de Administração do Parque Estação Biológica | DGP - Departamento de Gestão de Pessoas | DPS - Departamento de Patrimônio e Suprimentos | DPD - Departamento de Pesquisa e Desenvolvimento | DTI - Departamento de Tecnologia da Informação.


Comitê Gestor da Estratégia
CGE - PDE
Objetivos e Diretrizes Estratégicas
Agenda Institucional
Diretrizes a operacionalizar
Estratégico
P&D
Transf. Tecnologia
Comunicação
Des. Institucional
Comitê Gestor da Programação – CGP
Tático
MP 1
Grandes
Desafios
MP 2
Comp. & Sust.
Setorial
MP 3
Des. Tecn.
Incremental
MP 4
Trans. Tecn.
Comunicação
MP 5
Desenv.
Institucional
MP 6
Agricultura
Familiar
Operacional
UDs
PDUs

Embrapa Café

- **Consórcio Brasileiro de Pesquisa e Desenvolvimento do Café (CBP&DC): established in 1997.**
- **Coffee Technological Consortium: “pluralistic model, democratically participatory, coordination at national level and decentralized implementation”.**
- **+ 50 research institutions (from 1990)**
- **Institutionalized and Collective Research model**
- **Funcafé: successful funding**
- **Embrapa as strategic manager for research program**
- **Main goal is to focus in technological innovation to guarantee the sustainable development of brazilian coffee production chain.**
- **Main areas: biotechnology, ecofisiology, biotic stress preventions and responses, genetic improvement, disease prevention system, harvesting improvement.**
- **Equally important are sustainability issues as: climate change, pest bioecology, sustainable production systems development, water use optimization, and so on.**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• Embrapa Semiárido
• EBDA
• Uesb
• Agência Rural
• UFG
• Embrapa Café
• Embrapa Cerrados
• Embrapa Recursos Genéticos e Biotecnologia
• Mapa
• UCB
• UnB
• Cetcaf
• Incaper
• Ufes
• Coocamig
• Emater-MG
• Epamig
• Fundação Procafé
• IMA
• IFSULDEMINAS
• IFTM
• Mapa/Sarc
• SFA-MG
• Ufla
• UFMG
• UFU
• UFV
• Unilavras
• Uniube
• Emater-PR
• Iapar
• Mapa/Dcaf-PR
• Ocepar
• SAA-PR/Deral
• UEL
• UEM
• UFPR
• Cati/EDR
• Embrapa Informática Agropecuária
• Embrapa Instrumentação Agropecuária
• Embrapa Meio Ambiente
• Fapesp
• FGV
• IAC
• IAL
• IB
• IEA
• Inpe
• Ital
• Pólo APTA Nordeste Paulista
• Unesp/Botucatu
• Unicamp
• USP/Esalq
• USP/FFCLRP
• USP/Incor-HCFM
• BIO-Rio
• Emater-RJ
• Embrapa Agrobiologia
• Embrapa Agroindústria de Alimentos
• Pesagro-Rio
• Uenf
• UFRJ

Embrapa Soja and Genosoja

- Embrapa Soja: strategic manager of Genosoja and foster several other partnerships regarding to soybean culture researches.

- Consórcio Nacional para Estudos do Genoma da Soja (Genosoja): established in 2007, more than nine brazilian institutions are involved and is funded by CNPq.

- Main goal: identify and functionally characterize soybean genes that act in the physiological processes of the plant.

- Brazil participates in the International Soybean Genome Consortium - ISGC, formed by 25 reasearch groups around the world, such as: USA, China, Japan, Corea, Brazil, and so on.

- Brazil’s part in ISGC: deal with mechanisms that enhance the plant's development conditions in Brazil, ensuring resistance to disease, drought, among other issues.

- Genosoja is a part of the Embrapa Soja’s collaborative knowledge platform.

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CENARGEN
UFV
UNESP
UFRJ
UNICAMP
COODETEC
Embrapa
Soybean
General
Coordination
UFRGS
UFPE

Embrapa Agroenergia and Ridesa

- Embrapa Agroenergia: paradigm shift to go back to research biomass production for energy and not just production for food.
- Main goal is to expand operations of Embrapa Agroenergia and strengthen their research.
- Inter-University Network for the Development of Sugarcane Industry, Ridesa, established in 1991 and coordinated by Embrapa Agroenergia.
- Ridesa is a successful example of a network-based technological development of sugar cane seed production. The public-private partnership involves more than 300 companies producing sugar, ethanol and energy, and nine Brazilian federal universities.
- Ridesa is responsible for creating clones of sugarcane seedlings from seeds produced in the germplasm bank, where they are gathered over two thousand genotypes, among cultivars in the country, clones and different species imported from different sugarcane regions of the world.
- Among the opportunities for technological cooperation, Embrapa Agroenergia aims to achieve, in partnership with its units, with Ridesa and other institutions, the conceptual basis for the consolidation of a new public sugarcane upgrading program in Brazil.
- The design of an institutional arrangement that promotes the raprochement of sugar cane institutions in Brazil to boost research power, shows up at the time, a great challenge to be achieved.

Project Management

Transcriptomics (Expression Profiling)

Biotic & Abiotic Stress

Structural Genomics

Transgenesis

Proteomics

Bioinformatics

Knowledge Governance - 1

- the existence of a structured consensus on which sectors should be encouraged by the entrepreneurial State, where lies the technological frontier in these sectors and which countries reached it, depends:

i) the existence of a rear institutions capable of carrying out prospective and retrospective studies actually considered in the decision-making process;

ii) the continuous exercise of technology foresight, subject to periodic review processes;

iii) the ability to take into account conflicts of interest, but also to neutralize them when building the structured consensus; and, finally,

iv) an effective financial system embedded in innovation.

- Two conditions seem essential to coordinate the modernization of the countries process: visions of structured future and state dynamic capabilities to implement them.

- It is not a continuum of skills or competencies, but a variety of decision-making processes on long-term strategies and coordination in the design and implementation of technology policies.

Knwoledge Governance - 2

For the analysis of decision-making processes is important to address:

- the relationship between those who hold decision-making processes and those who subsidize them - research institutes, *think tanks*, universities, and so on;
- institutional support for strategic decisions;
- the presence or absence of effort to achieve a technological foresight vision;
- governance structures and power relations, when it’s possible, capture them; and
- conventions, shared beliefs, and consensus behind the future vision influencing the direction and decision-making process.

Knowledge Governance - 3

- The need to develop knowledge governance strategies that address persistent challenges in a broader governance context.

- Quantitative research (to design metrics to assess impacts)

- Empirical Case Studies (to test the effects of institutional arrangements on knowledge governance)

- Qualitative Research (to identify key constraints and facilitators to the effective application of knowledge)

Concluding Remarks

- Embrapa has a key role in agriculture and its technological frontier.

- By focusing in state-of-the-art technical development it exposes Brazil to both risks and benefits of defining its own technological frontier.

- Knowledge governance becomes essential to ensure continuous development through knowledge markets and networks.

- It’s the case of coffee, soybean and sugarcane innovation platforms => institutional arrangements for innovation.