INSTITUTO DE PESQUISAS TECNOLÓGICAS

COMUNICAÇÃO TÉCNICA

Nº 180171

DNA data storage: developed in Brazil by Lenovo and IPT dawn of a new era in digital storage solutions

Maria Cristina Machado Domingues
Marcelo Parada

Artigo publicado na Hannover Messe 2026., Hannover. 18 slides.

Instituto de Pesquisas Tecnológicas do Estado de São Paulo S/A - IPT
Av. Prof. Almeida Prado, 532 | Cidade Universitária ou
Caixa Postal 0141 | CEP 01064-970
São Paulo | SP | Brasil | CEP 05508-901
Tel 11 3767 4374/4000 | Fax 11 3767-4099

www.ipt.br

Smarter technology for all

DNA Data Storage

Developed in Brazil by Lenovo and IPT

Dawn of a new era in digital storage solutions

Maria Cristina Machado Domingues
Institute for Technological Research - IPT, Brazil

Dr. Marcelo Parada
Lenovo, Brazil

1. **The project overview**
   Lenovo & IPT partnership
2. **Motivation**
   Scientific Problem
3. **DNA Storage Technology**
   Benefits and Standards
4. **Project Goals and Deliverables**
   Hardware & Software
5. **Q&A**

The project Overview

Lenovo & IPT partnership

Lenovo ipt INSTITUTO DE PESQUISAS TECNOLÓGICAS

DNA Data Storage Project

- DNA Data Storage research project sponsored by **Lenovo Brazil** and developed by **IPT** leveraging IT Law R&D incentives

- More than 40 researchers, 17PhD

IPT

One of the biggest Brazilian Institute with more than 120 years of existence

Areas

Innovation; research & development; technological services; metrology development & support; and technology information & education

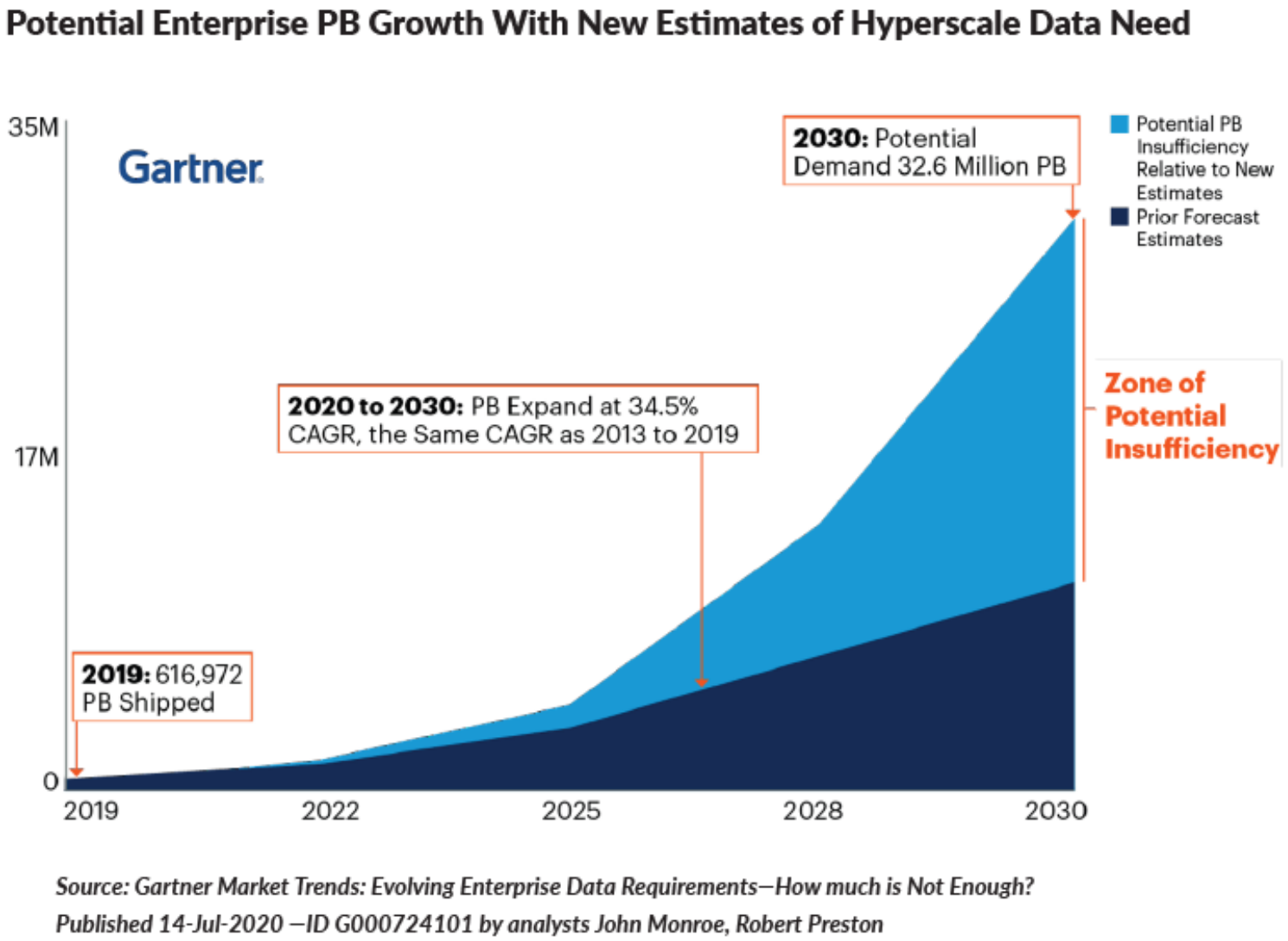
Lenovo ipt INSTITUTO DE PESQUISAS TECNOLÓGICAS

Motivation

Scientific Problem

Digital Data Growth

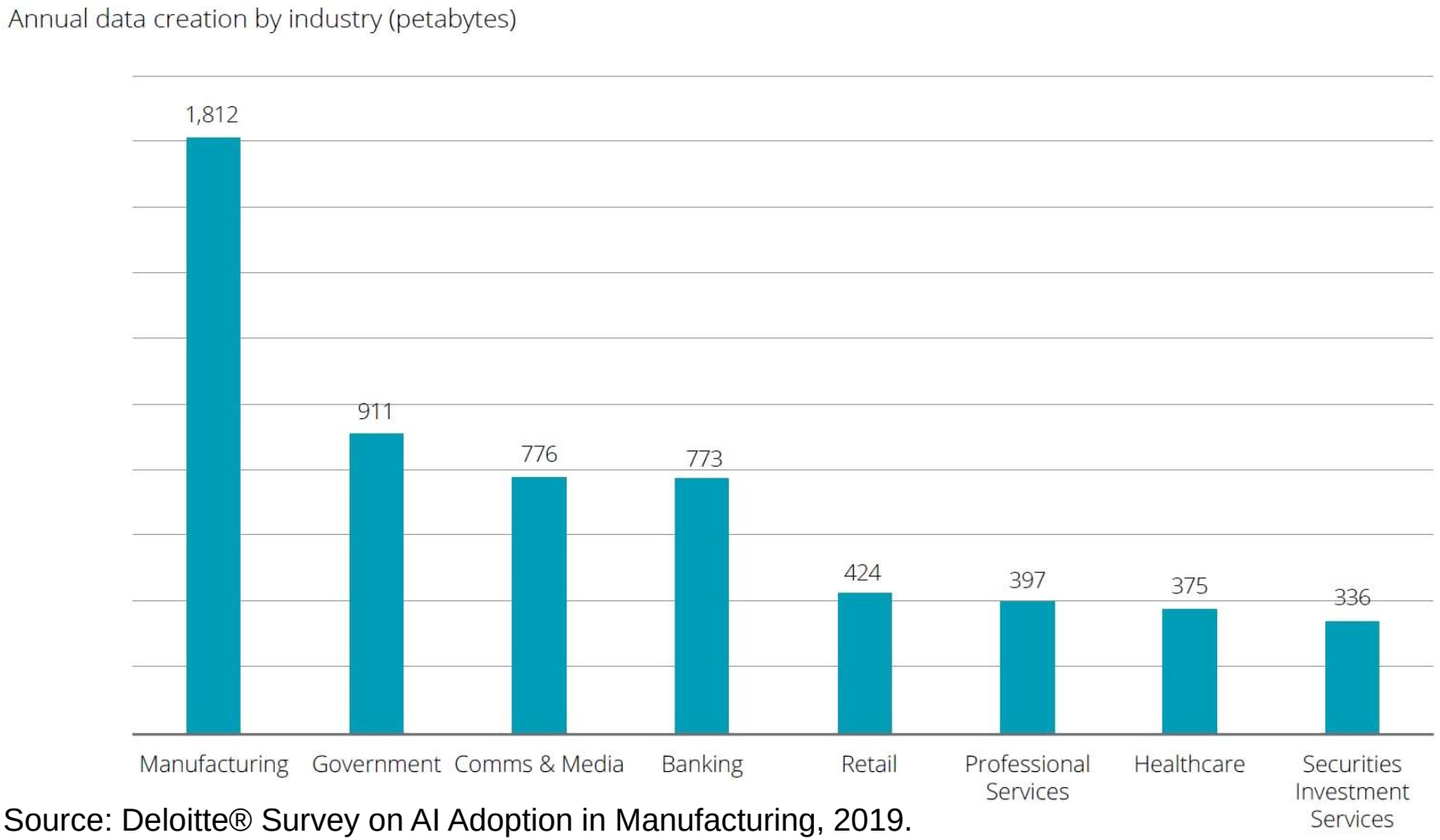
- AI
- Big data
- Smart Cities
- Smart Vehicles
- Video Streaming
- AR/VR



Source: Gartner Market Trends: Evolving Enterprise Data Requirements—How much is Not Enough?
Published 14-Jul-2020 —ID G000724101 by analysts John Monroe, Robert Preston

Lenovo ipt INSTITUTO DE PESQUISAS TECNOLÓGICAS

Amount of Data per segment



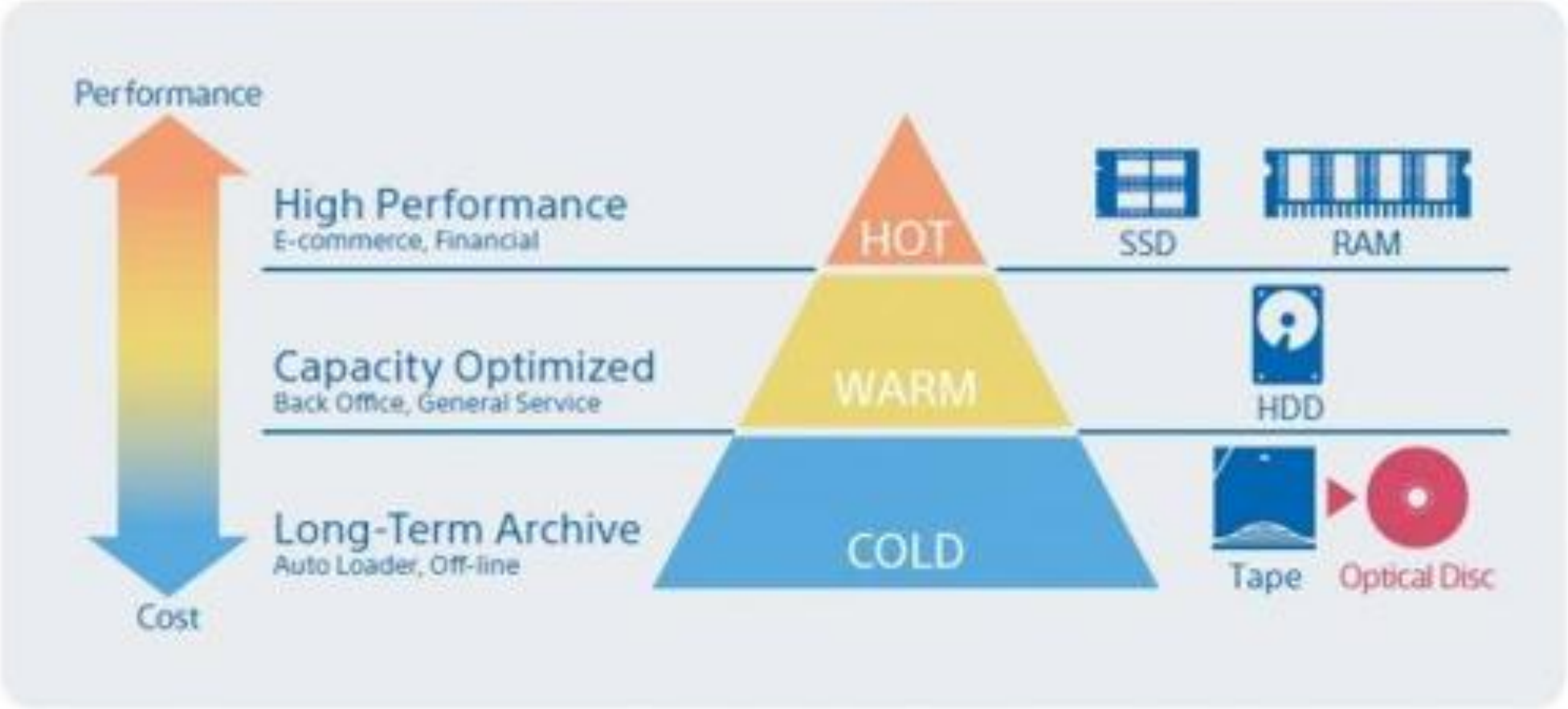
Manufacturing is positioned as Number 1 by Deloitte® Survey 2019

Source: Deloitte® Survey on AI Adoption in Manufacturing, 2019.

(https://www2.deloitte.com/cn/en/pages/consumer-industrial-products/articles/ai-manufacturing-application-survey.html)

Storage types

The amount of cold data is growing faster than data in the other tiers



DNA Storage Technology

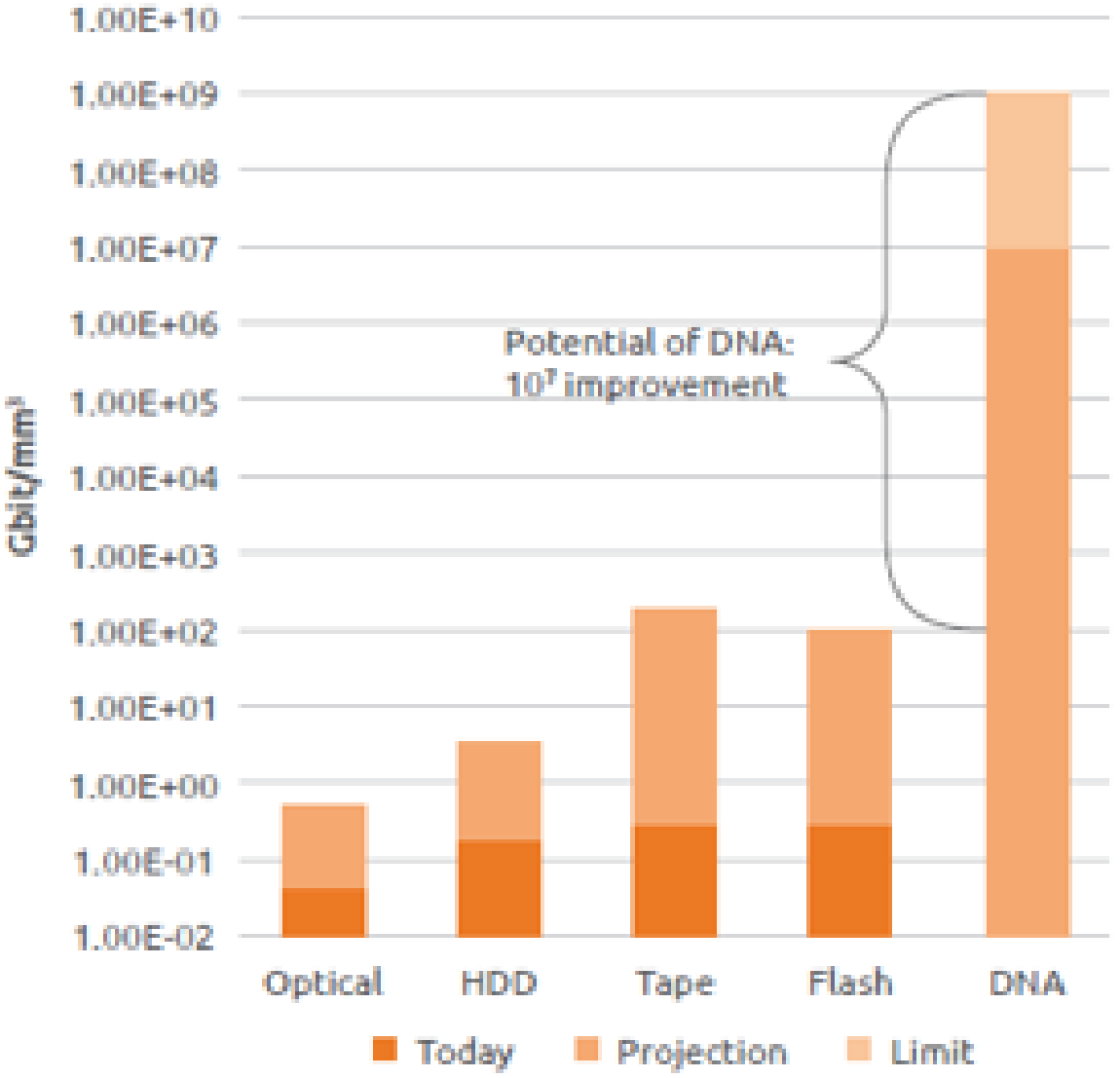
Benefits and Standards

Lenovo ipt INSTITUTO DE PESQUISAS TECNOLÓGICAS

Why DNA?

- DNA molecules are highly stable (half-life of ~500 years)
- DNA can store information more compactly and with lower energy consumption

- **Note**: Large data centers require significant physical space and account for approximately 2% of total electricity consumption in the United States.



Source: DOI: 10.13140/RG.2.2.34352.40960

DNA Data Storage: Unmatched Density

- **According to the DNA Data Storage Alliance:**
- DNA storage capacity is **115,000× higher** than current magnetic media used in data centers
- In the same physical space as an **LTO-9 tape cartridge** (18 TB):
  → DNA can store **~2 million TB**

Technology Standardization

SNIA®

Not-for-profit global organization

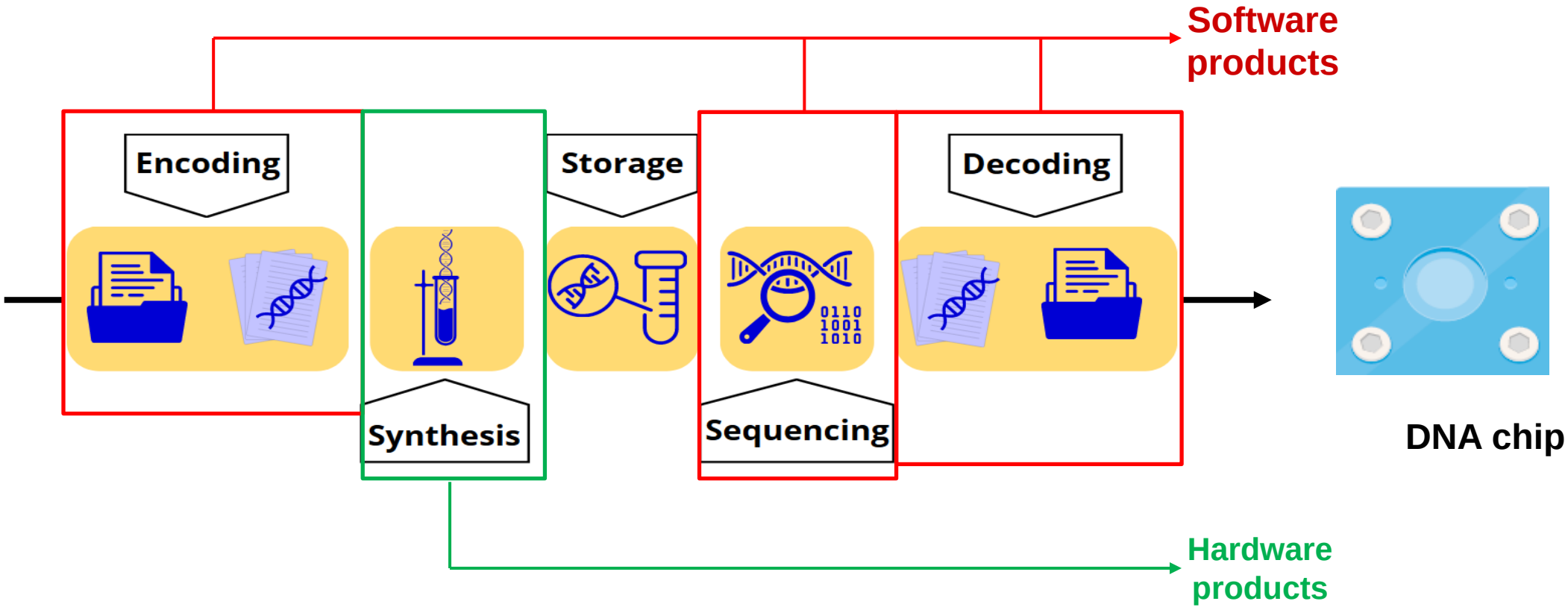
Leads the storage industry in developing and promoting vendor-neutral architectures, standards, and educational services that facilitate the efficient management, movement, and security of information.

Project Goals & Deliverables

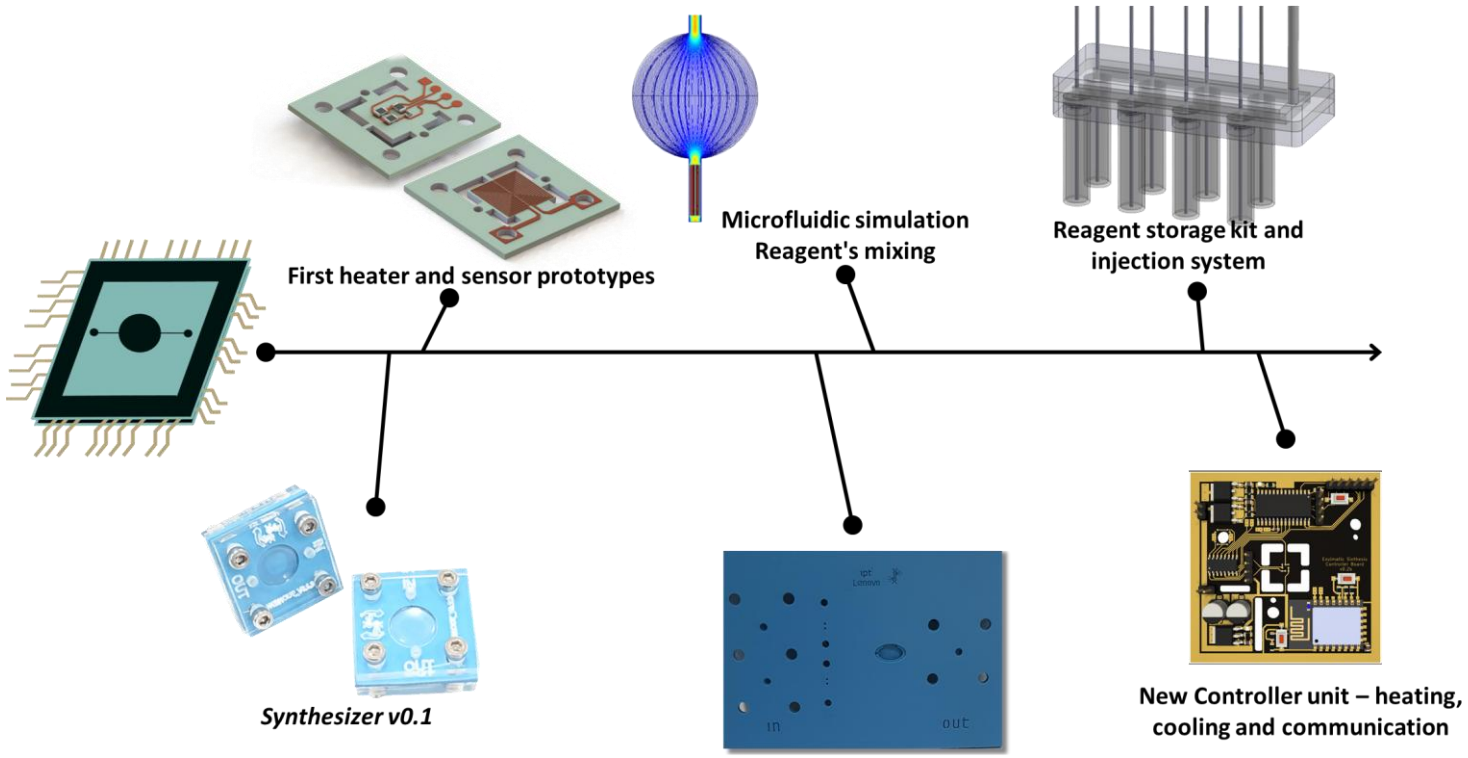
Hardware & Software

Project Goals

- Develop DNA synthesizer devices for DNA data storage
- Develop coding schemes for DNA data storage



Project Deliverables



- **End-to-end DNA data storage system**
  From digital data to DNA and back
- **Working prototypes**
  Microfluidic synthesizers (enzymatic & chemical)
- **Proven technology**
  ~67K oligos | 100% data recovery
- **Scalable architecture**
  Designed for parallel DNA synthesis

→ **A Brazilian breakthrough in DNA data storage**

Patented Technology

Lenovo ipt INSTITUTO DE PESQUISAS TECNOLÓGICAS

Project remarks

- Seven patents filed
- International Congress participation (SDC 2022, SDC2023)
- In-house enzymes production for enzymatic Synthesis process
- New devices for electrochemical synthesis and enzymatic synthesis
- CODEC including Error Correction Coding, channel coding, mapping, clustering, alignment and recovering techniques
- Participation in SNIA Technical Working Groups
- 04 international publication, 05 events

Lenovo ipt INSTITUTO DE PESQUISAS TECNOLÓGICAS

Q&A

Smarter technology for all

Lenovo

ipt INSTITUTO DE PESQUISAS TECNOLÓGICAS

thanks.

MCTI