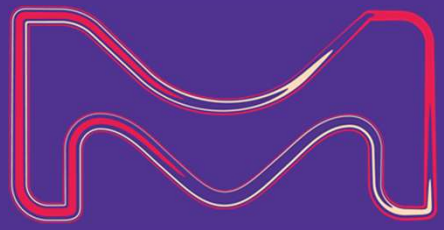
The businesses of Merck KGaA, Darmstadt, Germany operate as
EMD Serono, MilliporeSigma and EMD Electronics in the U.S. and Canada.

Building Across Boundaries

Cross-functional Innovation: Microphysiological Systems Project

Sakshi Garg, PhD
Science & Technology Office
Merck KGaA, Darmstadt, Germany



EMD Serono MilliporeSigma EMD Electronics


“In times of rapid change, experience could be your worst enemy.”
- Paul Getty

is at the

Science heart

of everything we do

From advancing genome editing technologies and discovering unique ways to treat the most challenging diseases to enabling the intelligence of devices – Merck is everywhere.

Merck transformed from a local pharmacy in 1668 into a global science and tech company

Life Science

Together, we impact life and health with science.

Healthcare

We help to create, improve and prolong lives.

Electronics

We are advancing digital living.

Facts & Figures

62,461
employees

65
countries

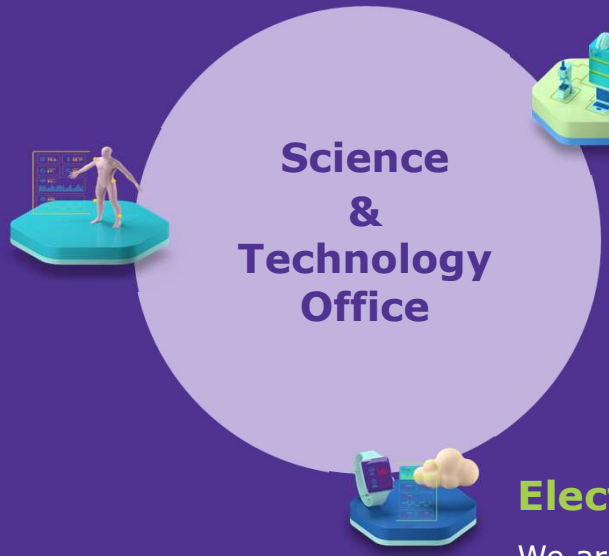
2.4
R&D (€ billion)

39%
Women in leadership positions

Sales
in € million

Source: Merck, Annual Report 2025

The Science & Technology Office build cross-sector programs and platforms to unlock opportunities no single sector can own alone



Healthcare

Our approach to grow as a Global Specialty Innovator

- Rare Diseases
- Oncology
- Autoimmune Diseases
- Neurological Diseases

Life Science

Enable tomorrow's medical breakthroughs with best-in-class science, technologies, and expertise.

Electronics

We are advancing digital living.

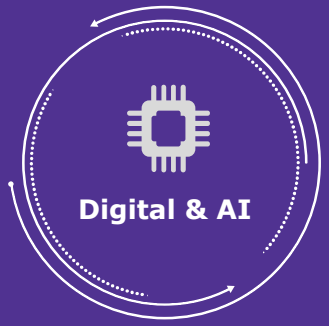
Our contributions to the electronic industry help enable high-tech materials and solutions that are vital to our everyday lives.

We translated common industry macrotrends into five strategic priority areas, driving focused innovation and impact

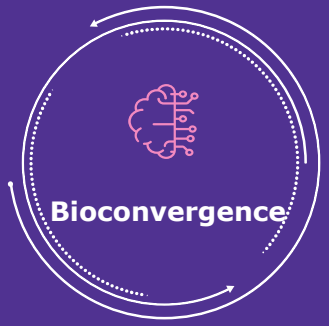
Personalized medicine, drug discovery, diagnostics, and treatment planning, leading to **shorter timelines, lower cost and better success**

Automation & optimization of **production efficiency,** leading to significant advancements in **logistics and operational processes**

Managing resource consumption, renewable energy sources, and developing **sustainable product alternatives**



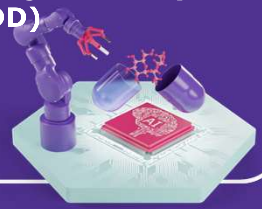
Automating processes, **analyzing large datasets** for actionable insights, enabling **predictive analytics**, and enhancing **decision-making** across various digital platforms and systems

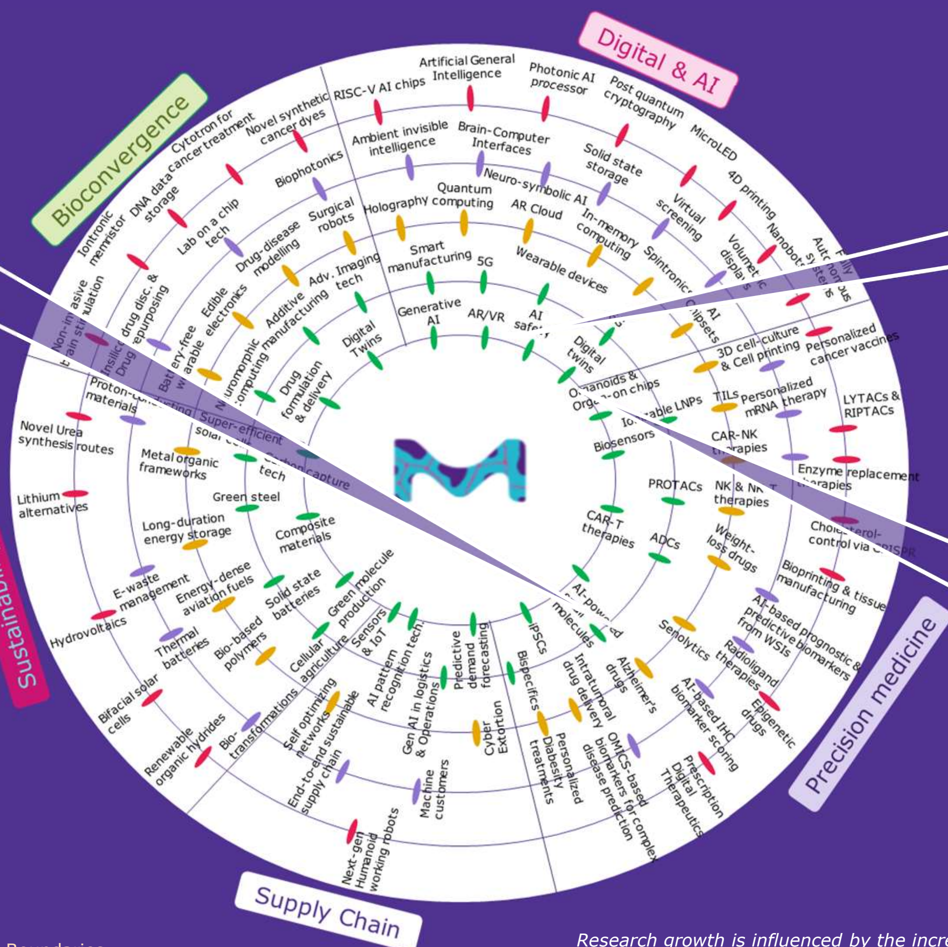


Leveraging the **intersection of biology, chemistry, and technology** to address complex challenges and create new processes and products

From Scouting to Strategy: Selecting Cross-Sector Technologies

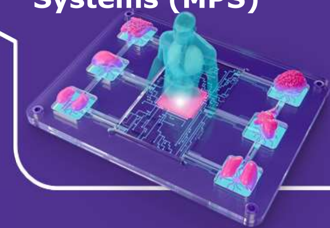
Artificial Intelligence in drug discovery (AIDD)





Syntropy

Microphysiological Systems (MPS)



Tech Adoption

Emerging

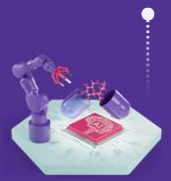
- Nascent
- Early adoption
- Accelerating
- Scaling

Growing

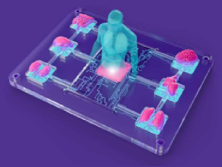
AI4TRENDS

Research growth is influenced by the increase in the volume of scientific records, while Adoption is measured by the speed of that growth.

Operating across Life Science, Healthcare, and Electronics, we drive convergence "on the fly" and established strategic initiatives accelerating drug development along the entire value chain



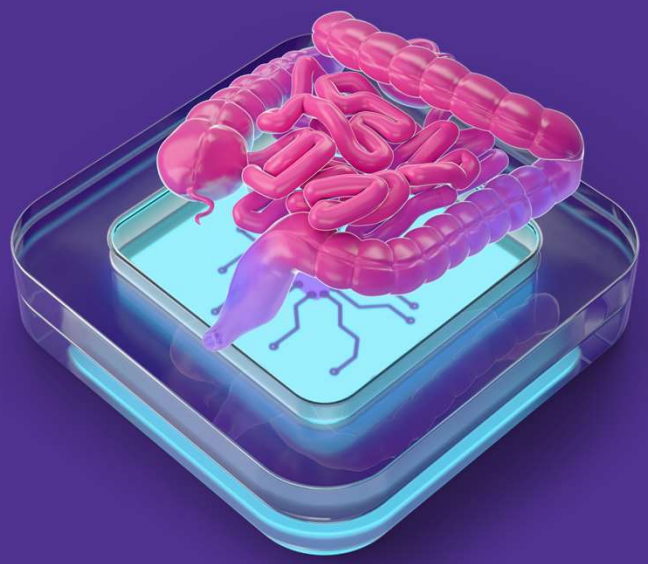
AI in Drug Discovery
Fully autonomous, end-to-end integrated lab in the loop to speed up DMTA cycle



Microphysiological Systems
combining repeatable, human-based organoid biology with advanced semiconductor hardware.

Syntropy
Trusted research environment

By mimicking human organ-level functions, Microphysiological Systems (MPS) bridge the gap between cell cultures and animal models



Drug Discovery and Testing

MPS enables more accurate predictions of human responses to drugs, reducing reliance on animal testing and increasing the likelihood of clinical success.

Personalized Medicine

MPS can use patient-specific cells to tailor treatments, enhancing therapeutic outcomes.

Human Biology Research

These systems deepen our understanding of disease mechanisms and organ functionality in a controlled environment.

I venture a personal speculation: it will no longer be a matter of decades, but only of years.”

Belén Garijo, Chair of the Executive Board and CEO of Merck

Technology convergence is accelerating transformation and creating opportunities for the bold

World's largest taxi company	Owns NO taxis
World's largest accommodation provider	Owns NO Real Estate
World's largest phone company	Owns NO Telco infrastructure
World's largest valuable retailer	Owns NO Inventory
World's popular media owner	Owns NO Content
World's fastest growing bank	Owns NO actual money
World's largest movie house	Owns NO Cinemas
World's largest software vendors	Owns NO Apps

Modified from http://hectorhernandez.me/digital-ecosystems/digital-transformation-versus-digital-disruption/

We've teamed up with the Interuniversity Microelectronics Centre (imec)

Imec is a world-leading research and innovation center in nanoelectronics and digital technologies. It leverages its state-of-the-art R&D infrastructure and its team of more than 6,000 employees and top researchers for R&D in various research fields, such as advanced semiconductor and system scaling, silicon photonics, artificial intelligence, beyond 5G communications and sensing technologies.

The edge they bring in:

- Vascularization
- High resolution imaging access
- Biosensing in organ compartment
- Sampling for offline measurement
- In-situ continuous and label-free measurement of cell adhesion, viability and barrier integrity

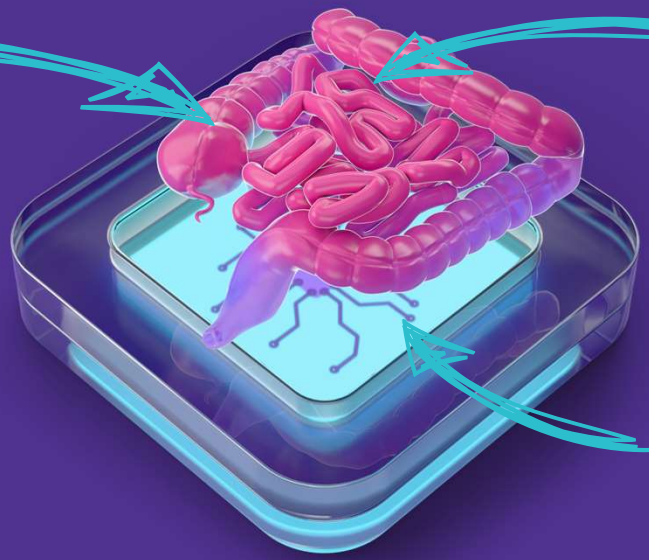
Merck's expertise across sectors combined with imec's leadership in nanotechnology creates a unique pathway to developing superior MPS

Electronics

- Deep semiconductor ecosystem network
- Understanding of complex hardware integration & compatibility with biology

IMEC

- Advanced semiconductor chip provider with integrated sensors and offline measurement for high volume, real-time data collection

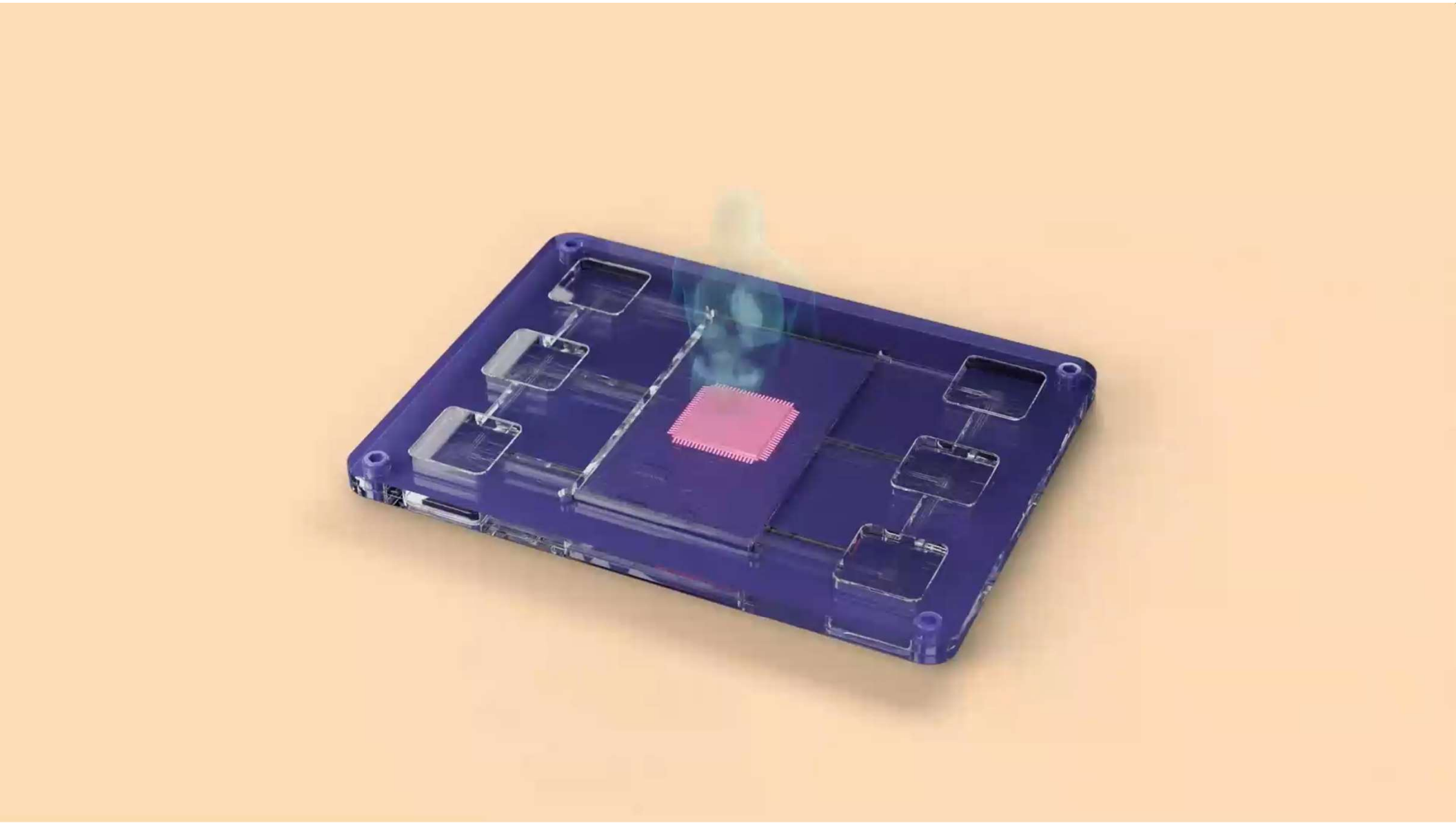


Life Science

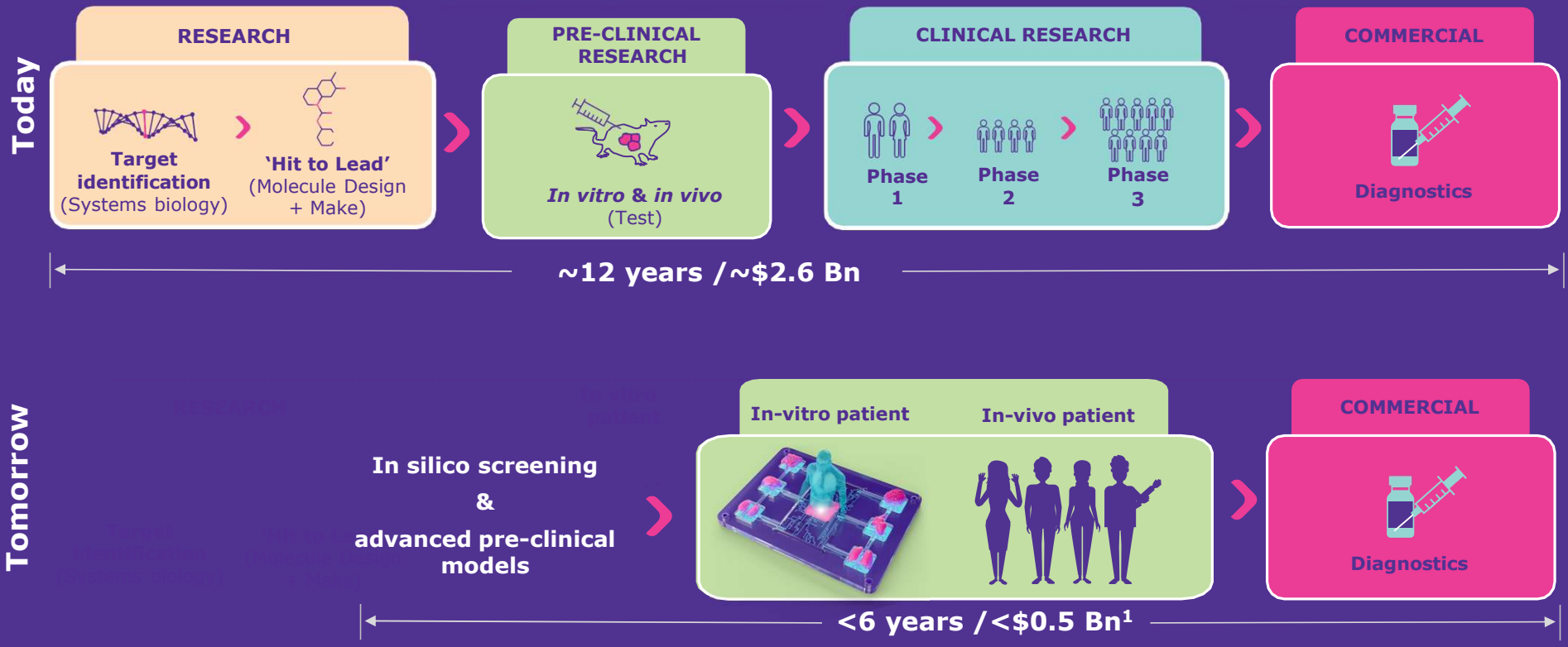
- Biology expertise with established organoid offerings and years of experience
- Complete solution, established QC processes, Global Sales & Service footprint

Healthcare

- Significant application data points
- Requirements of pharmaceutical industry (toxicology, disease modeling, DMPK expertise)



This ecosystem will enable to deliver transformative healthcare solutions to patients and healthcare systems faster



Source: (1) ALTEX 2016

Ambition vs Execution

83%

of senior executives say innovation is a top priority

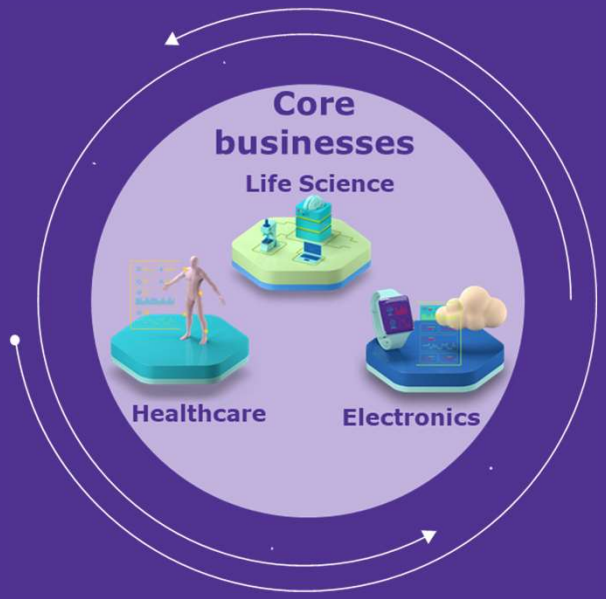
3%

of companies are actually ready to deliver on it

Priority ≠ Readiness

BCG 2024 Annual Innovation Study

Collaboration Doesn’t Just Happen. It’s Designed



1	**A Neutral Convener Above Business Boundaries** Governance architecture over just project management
2	**Central Funding as the Great Equalizer** Central funding removes that implicit hierarchy
3	**Scientist-to-Scientist Trust Over Managerial Alignment** Managers ratify; scientists co-create

What Actually Moves The Needle

Lessons from launching MPS as a cross-BU initiative - what mattered before the science could matter.

Governance

Start with structure, not science

People

Find the scientists, not just the sponsors

Framing

Localize the value proposition

Timing

Use external signals to drive internal urgency

Harsh Truth

The initiative will move slower than the Science.

Organizational alignment is the rate-limiting step.
No amount of scientific enthusiasm can shortcut it.

Thank you!

EMD SERONO MilliporeSigma EMD Electronics