OnePlanet Research Center

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imec, Wageningen University & Research, Radboud University and Radboudumc

From Sensor Innovation to Clinical Validation: The OnePlanet Ingestible Sensor Journey

Imec, world-leading research and innovation hub in advanced semiconductor technologies

Founded in **1984**

Unique ecosystem, collaborating with **600+ industrial partners**

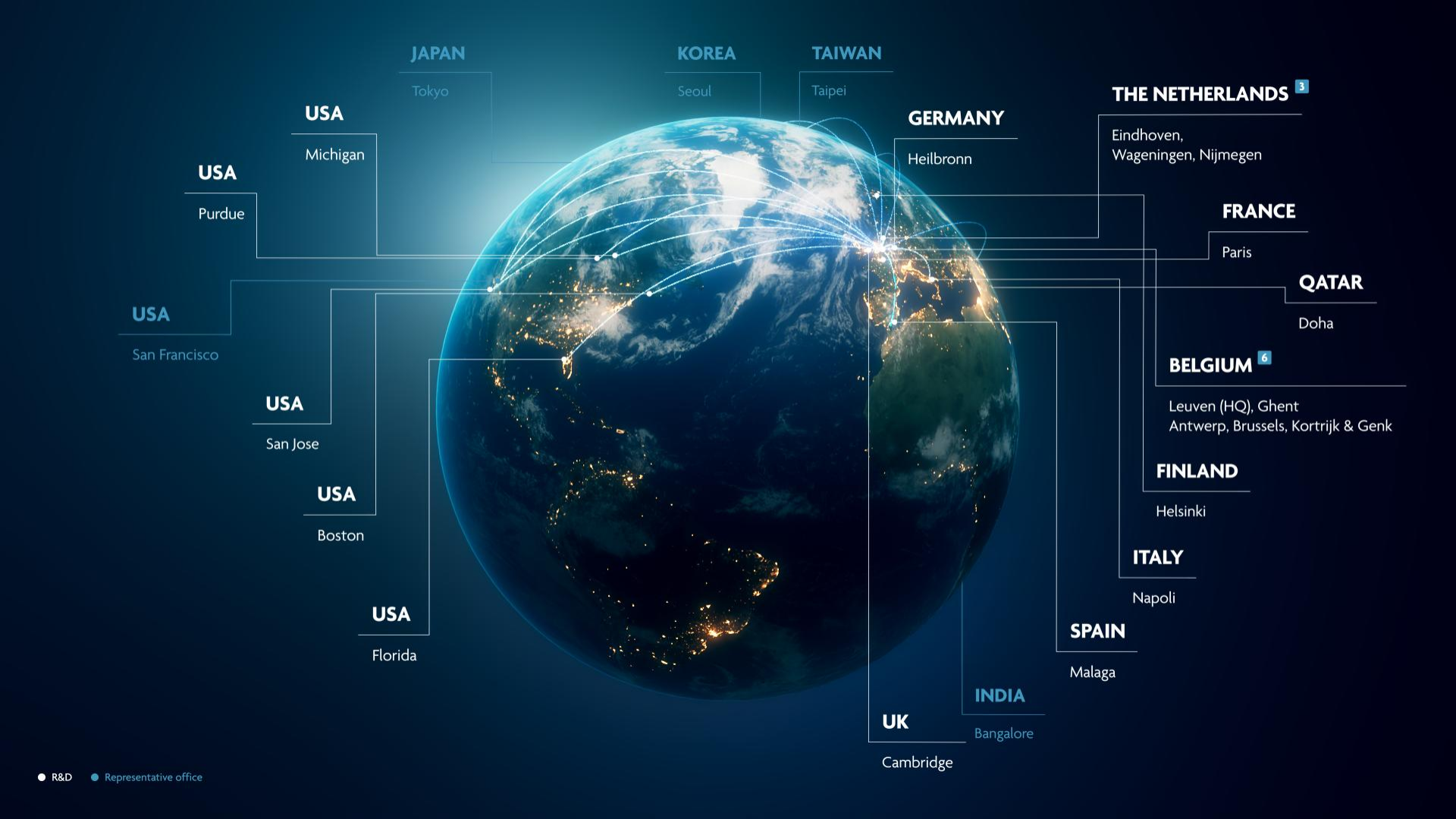
~ $4B invested in **leading-edge semiconductor fabs**

>6,500 employees

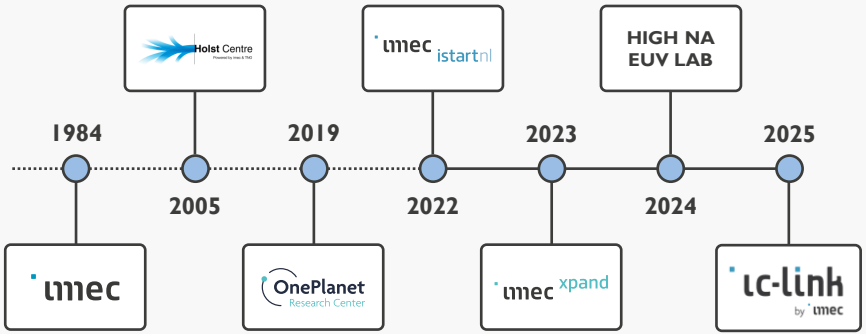
Focus on bridging R&D to manufacturing **for compute & system technologies, health, automotive, industry & consumer, space & defense**

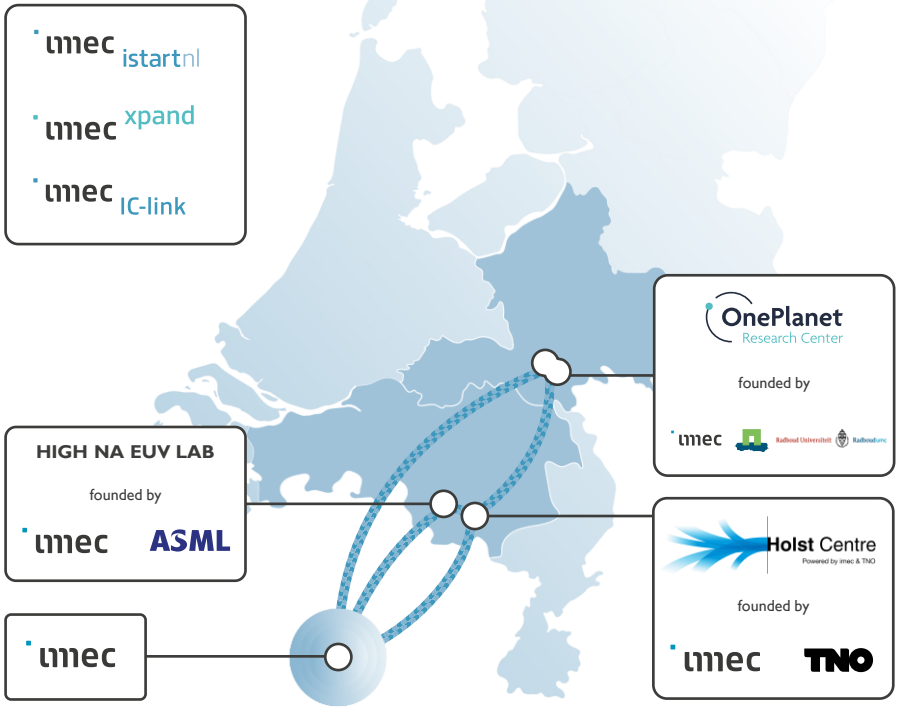
2025: €1,2B revenue, 214 filed first patent applications, 1400+ peer reviewed publications

imec


JAPAN
Tokyo
KOREA
Seoul
TAIWAN
Taipei
USA
Michigan
USA
Purdue
GERMANY
Heilbronn
THE NETHERLANDS 3
Eindhoven,
Wageningen, Nijmegen
FRANCE
Paris
QATAR
Doha
USA
San Francisco
USA
San Jose
BELGIUM 6
Leuven (HQ), Ghent
Antwerp, Brussels, Kortrijk & Genk
USA
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FINLAND
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Representative office

Imec in the Netherlands







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Chip- and digital innovations for a sustainable future in health, environment & agrifood



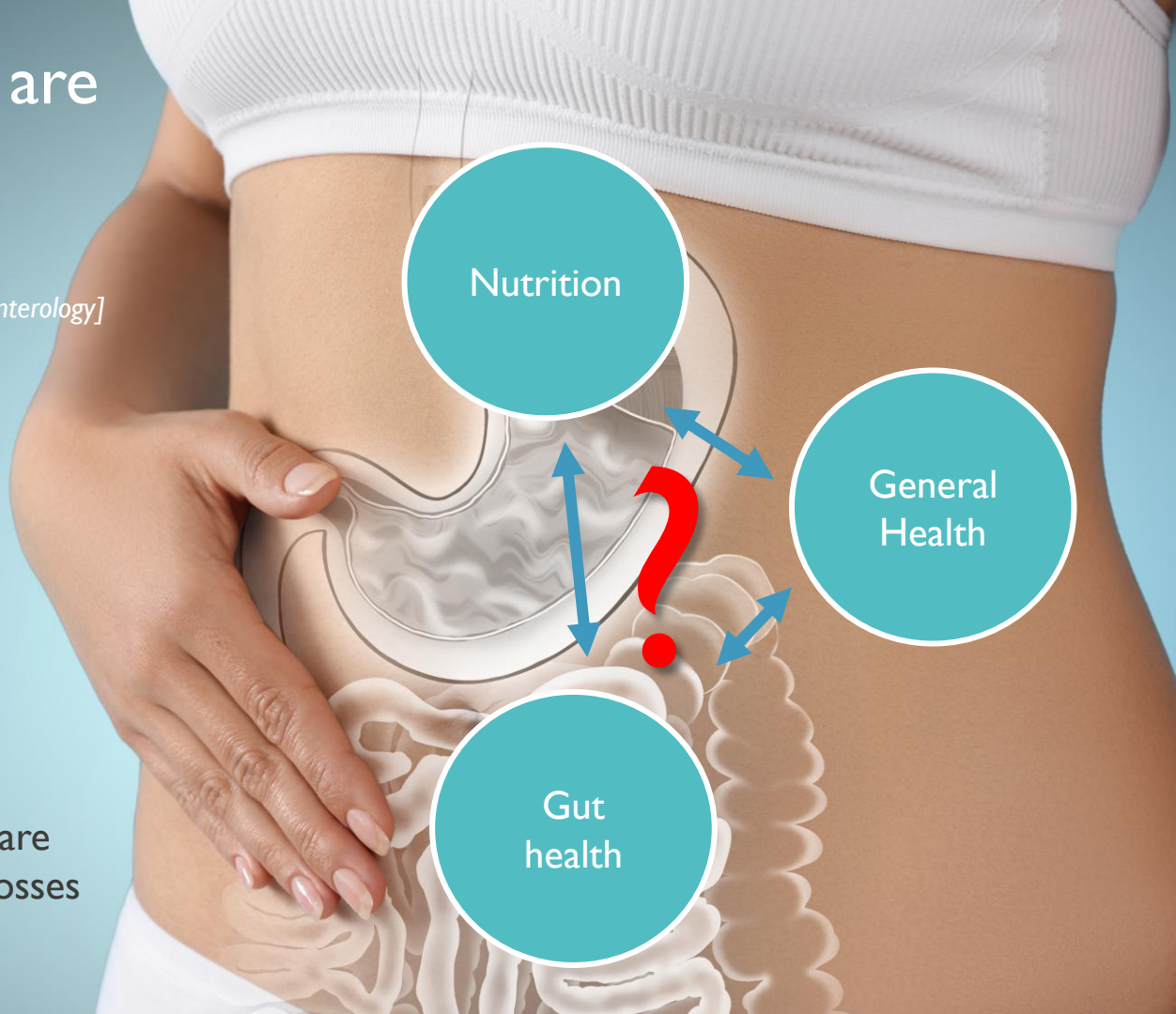
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WAGENINGEN UNIVERSITY & RESEARCH

Radboud University Radboudumc university medical center

> 300 million people are living with a digestive disorder in Europe

[United European Gastroenterology]



and generate >$20B/year in healthcare costs, plus substantial productivity losses

Current Tools for gastro-intestinal research

Partial info, expensive, cumbersome and often not representative of real life

Visual inspection:

- Endoscopy / colonoscopy
- Capsule endoscopy



Data outside GI tract:



Limitations:

- Empty tract required
- Cumbersome
- Expensive
- No biochemical monitoring inside gut

need for in-vivo localized biochemical monitoring technology both in clinical and in research/discovery setting

GISMO

Gastro-**I**ntestinal **S**ensor **Mo**dule

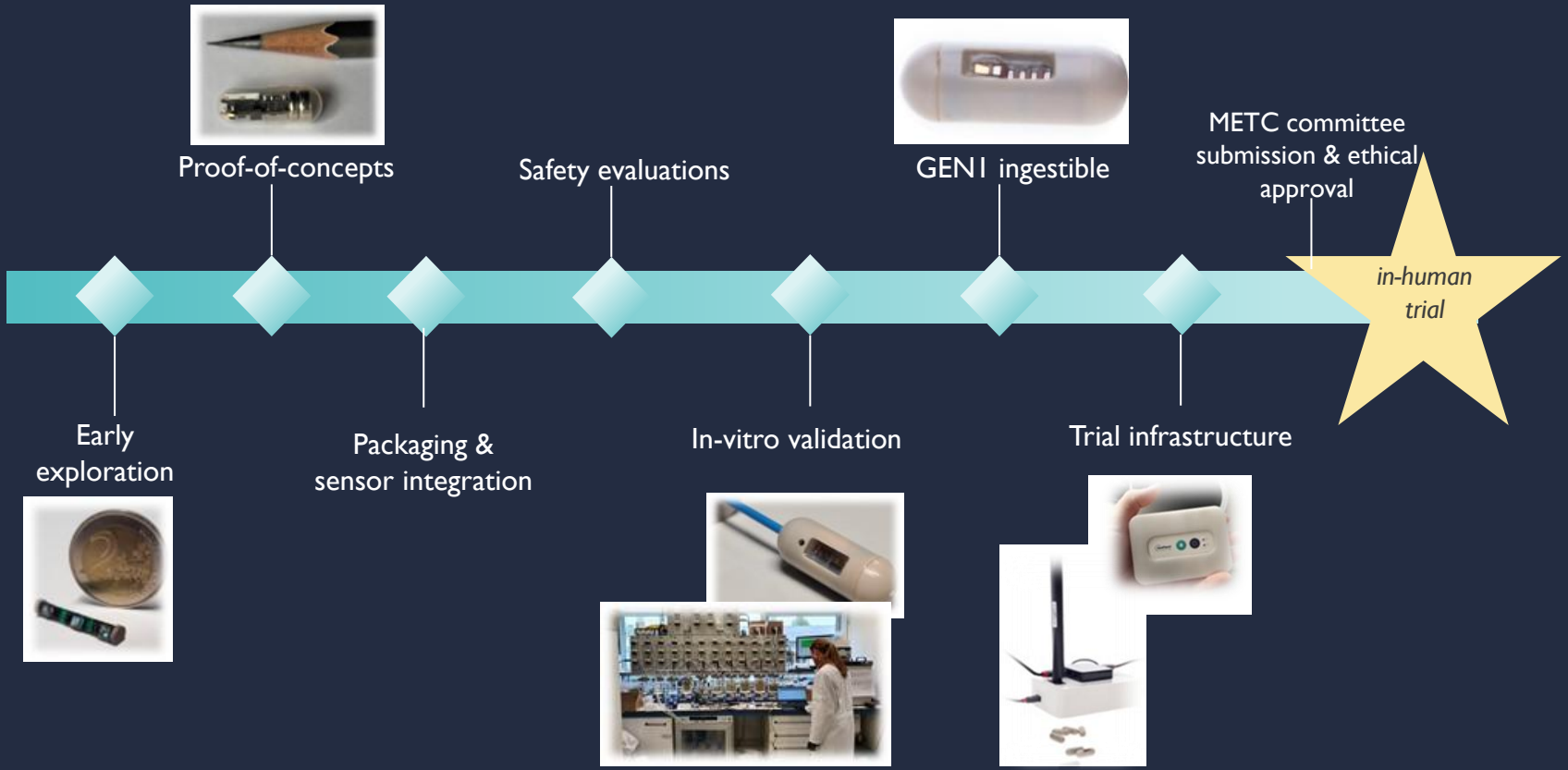


Wireless data transfer every 20 sec
21.6 x 7.64 mm (pill size 0)
Investigational Device

Measurement of

- **pH**
- **Redox balance, ORP**
- **Transit times [total – stomach – small intestine – large intestine]**
- **Temperature**

Ingestible Sensor Development

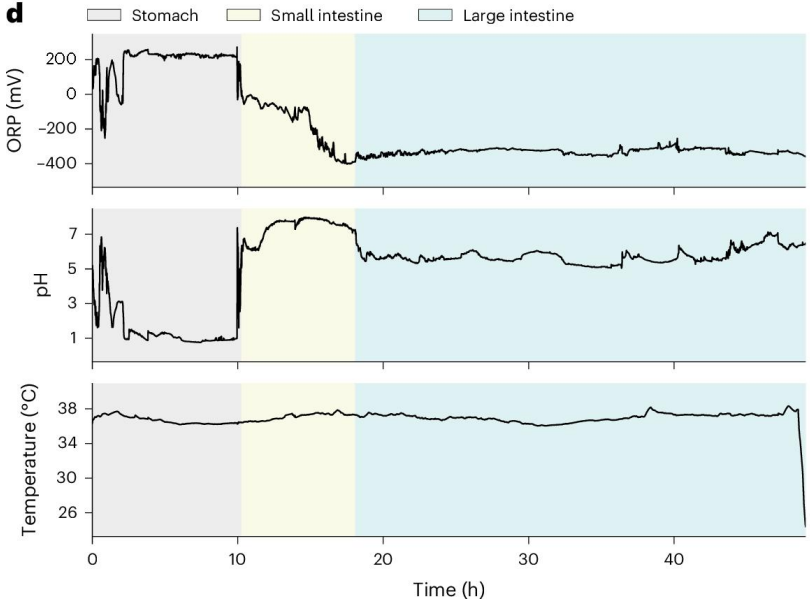


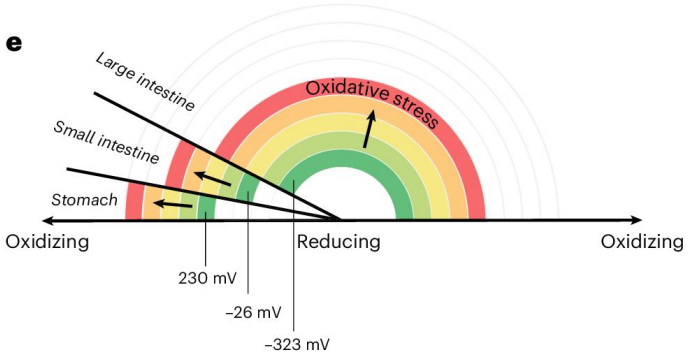






Measurements of redox balance along the gut using a miniaturized ingestible sensor





Published in nature electronics 2025:
https://www.nature.com/articles/s41928-025-01411-4

Clinical Investigational Device

- All participants found sensor easy to swallow
- No safety issues identified

→ Device ready to be used in clinical trials



Ingestible Sensor Development



Proof-of-concepts

Safety evaluations



GEN1 ingestible

METC committee submission & ethical approval

Market research, business case evaluations

in-human trial

Early exploration



Packaging & sensor integration

In-vitro validation



Trial infrastructure



Clinical studies:

- RadboudUMC: IBD, colon cancer
- UZL: bariatric surgery

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