



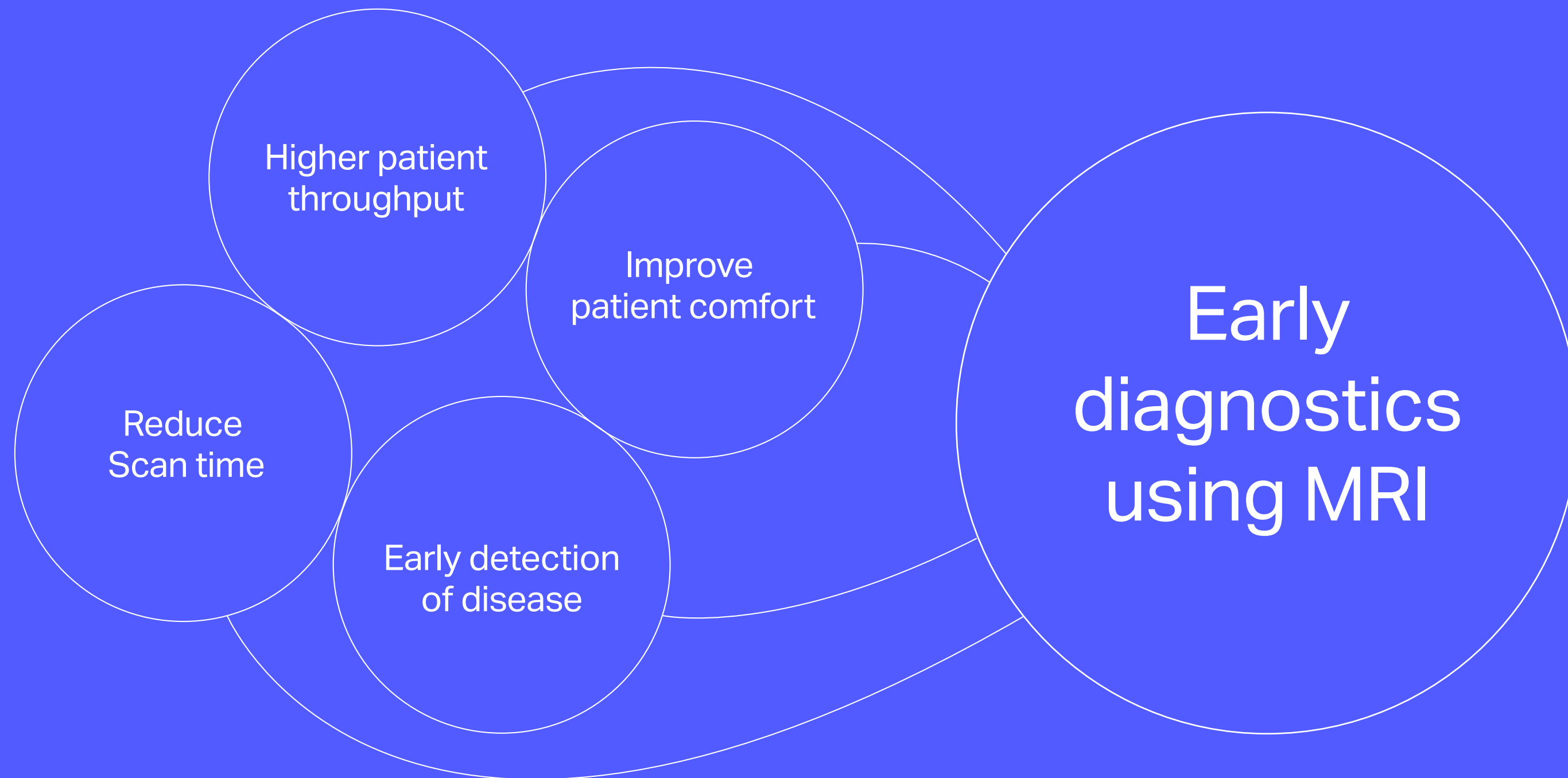
# Multiwave Imaging®

Pushing the boundaries of medical imaging  
in MRI with metamaterials

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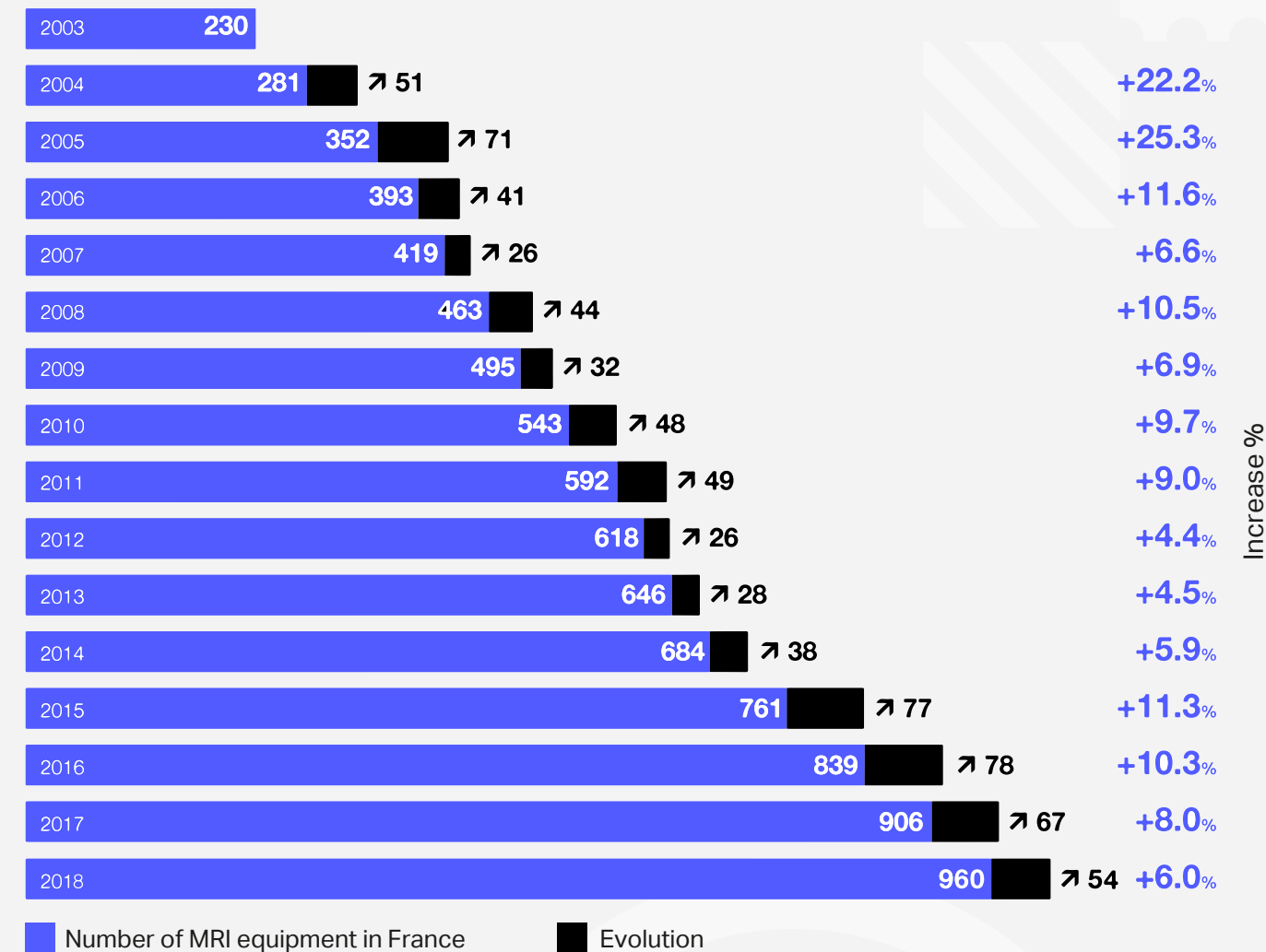
## Mission





While the number of MRI scanners has increased x4 in the last 20 years, average waiting times for an MRI scan remain stable around 30 days.

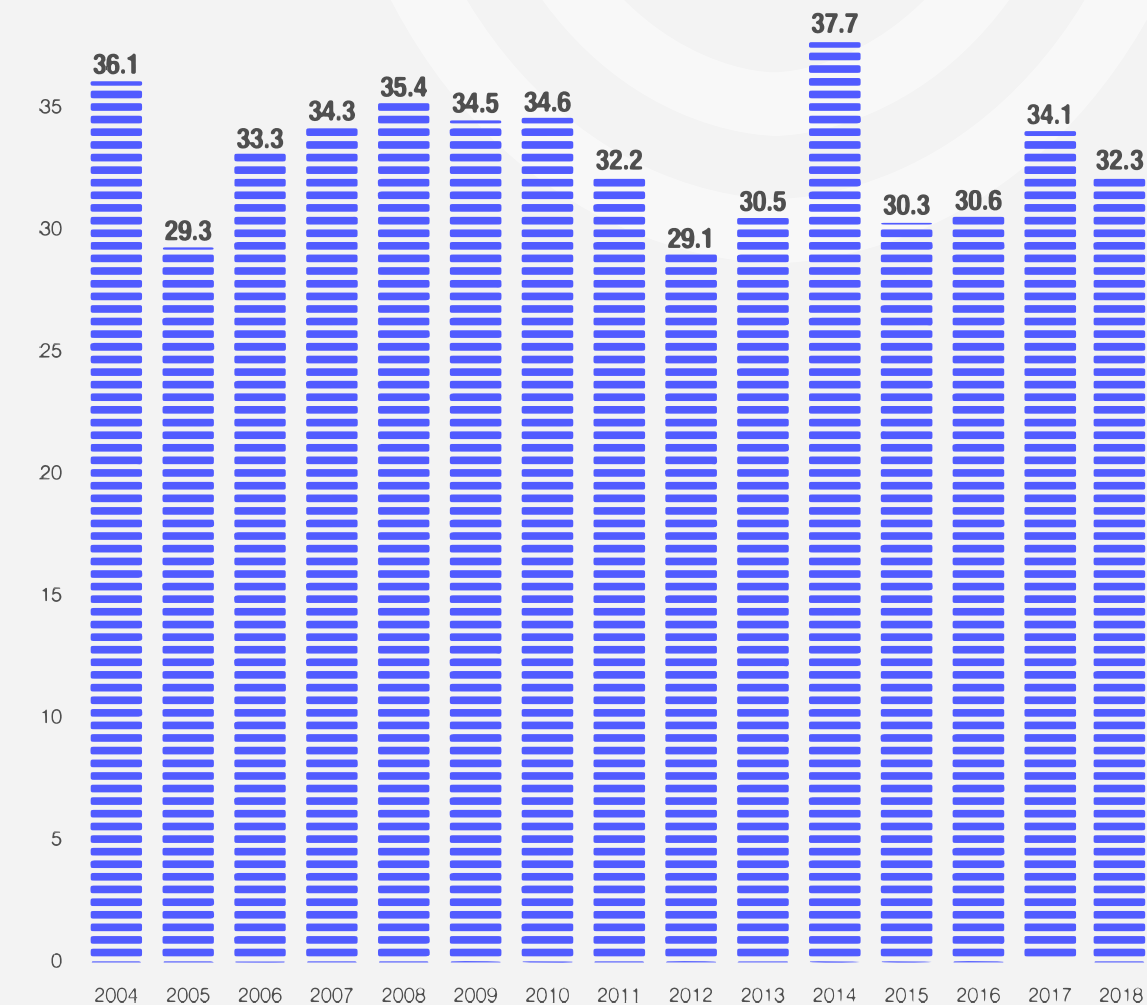
Evolution of MRI equipments from 2003 to 2018



## Context

### MRI is experiencing increased demand for higher patient throughput

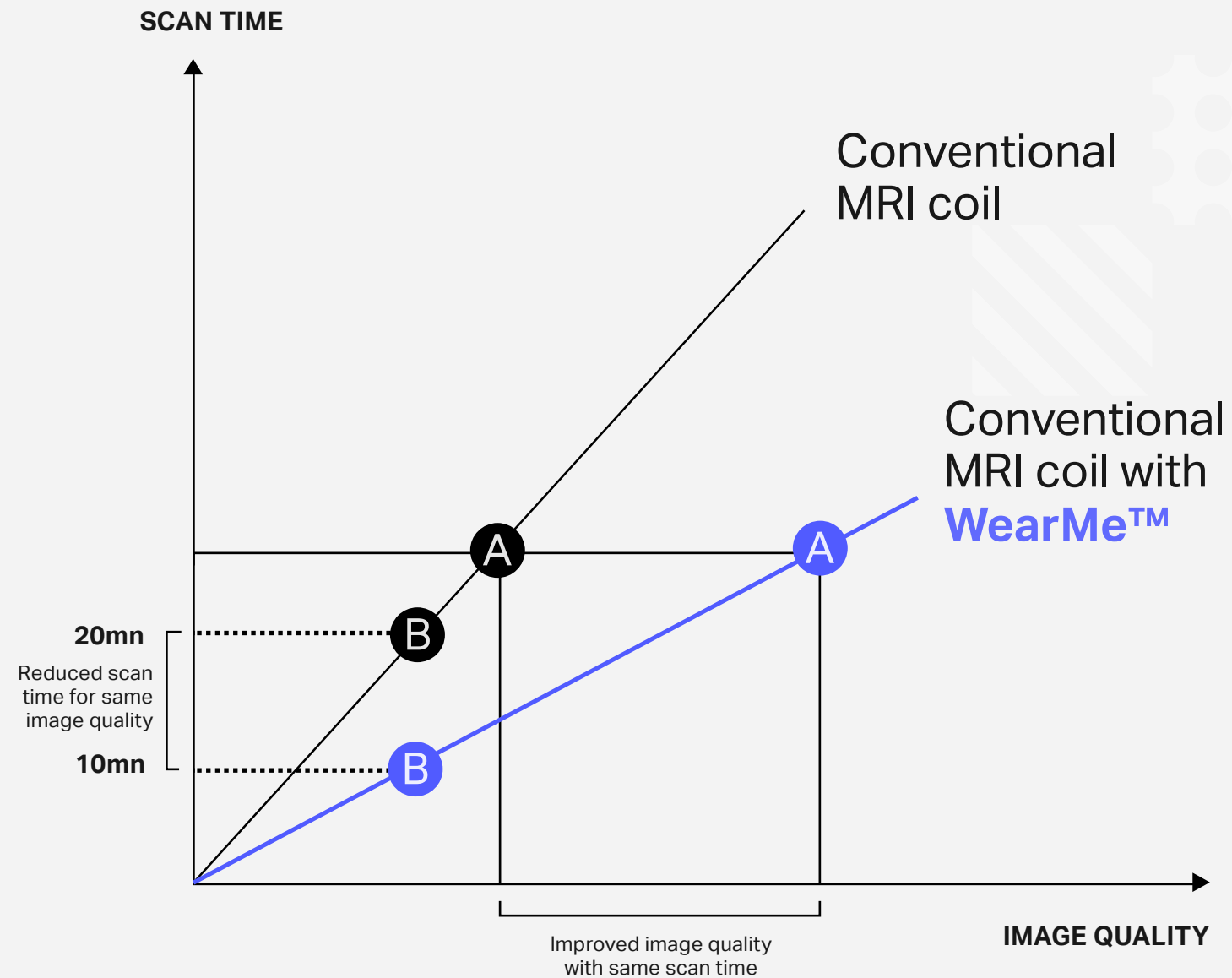
Average waiting days for an MRI scan appointment in France. (OECD countries follow similar patterns)



Source : CEMKA – SNITEM 2018



# The Challenge



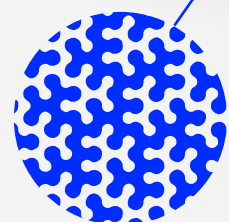
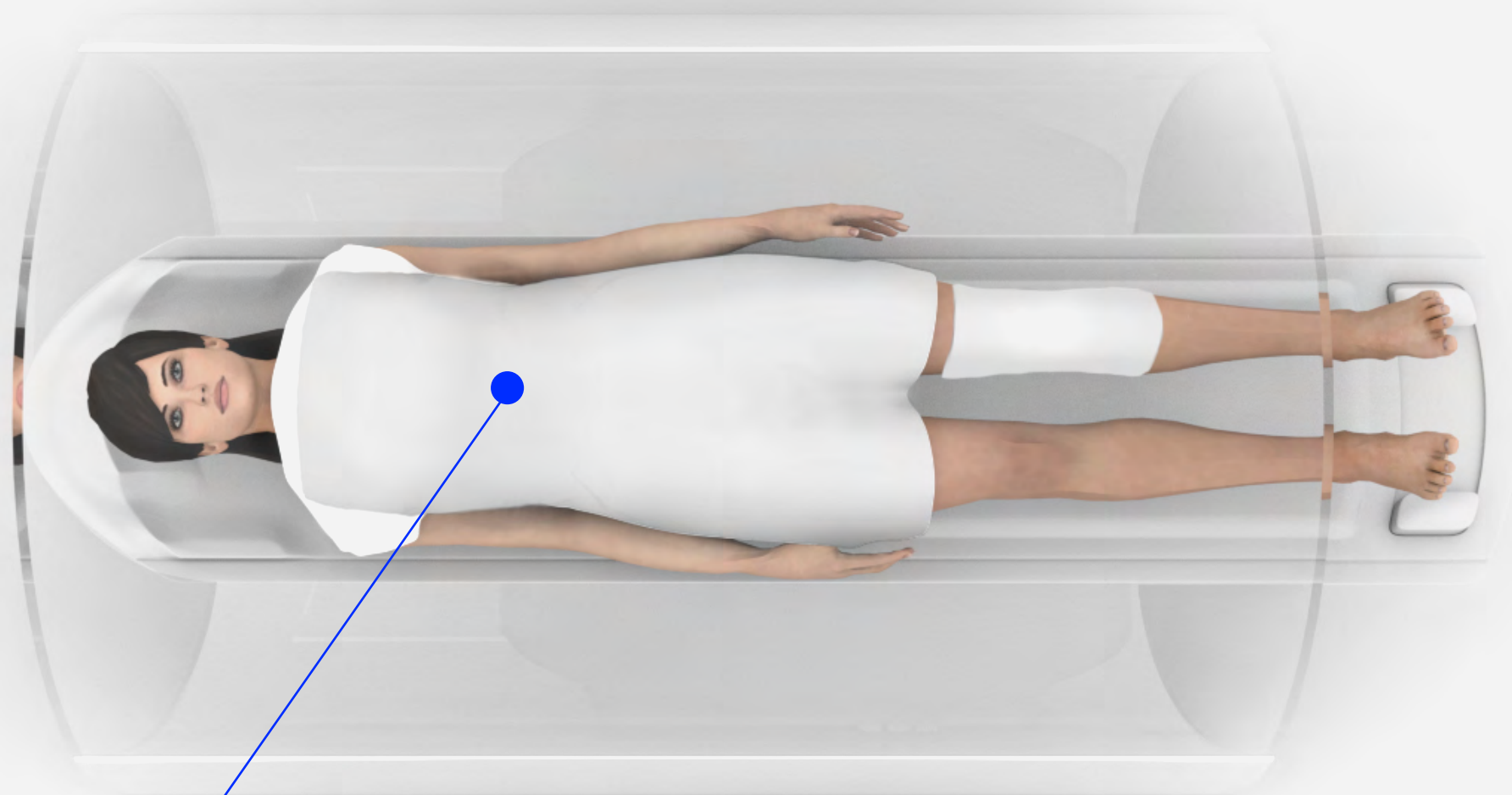
The longer the MRI scan time, the better the image quality, but the longer waiting times become.

The challenge lies in reducing scan time for the same image quality or improving image quality for the same scan time (depending on physician's priorities).

- A** For a given scan time, WearMe drastically improves image quality.
- B** For a given image quality, WearMe drastically reduces scan time.



# Our Core Technology



Patented Electromagnetic metamaterial technology

## WearMe™

Introducing WearMe™, a fully wireless and wearable MRI device improving the trade-off between scan time and image quality.

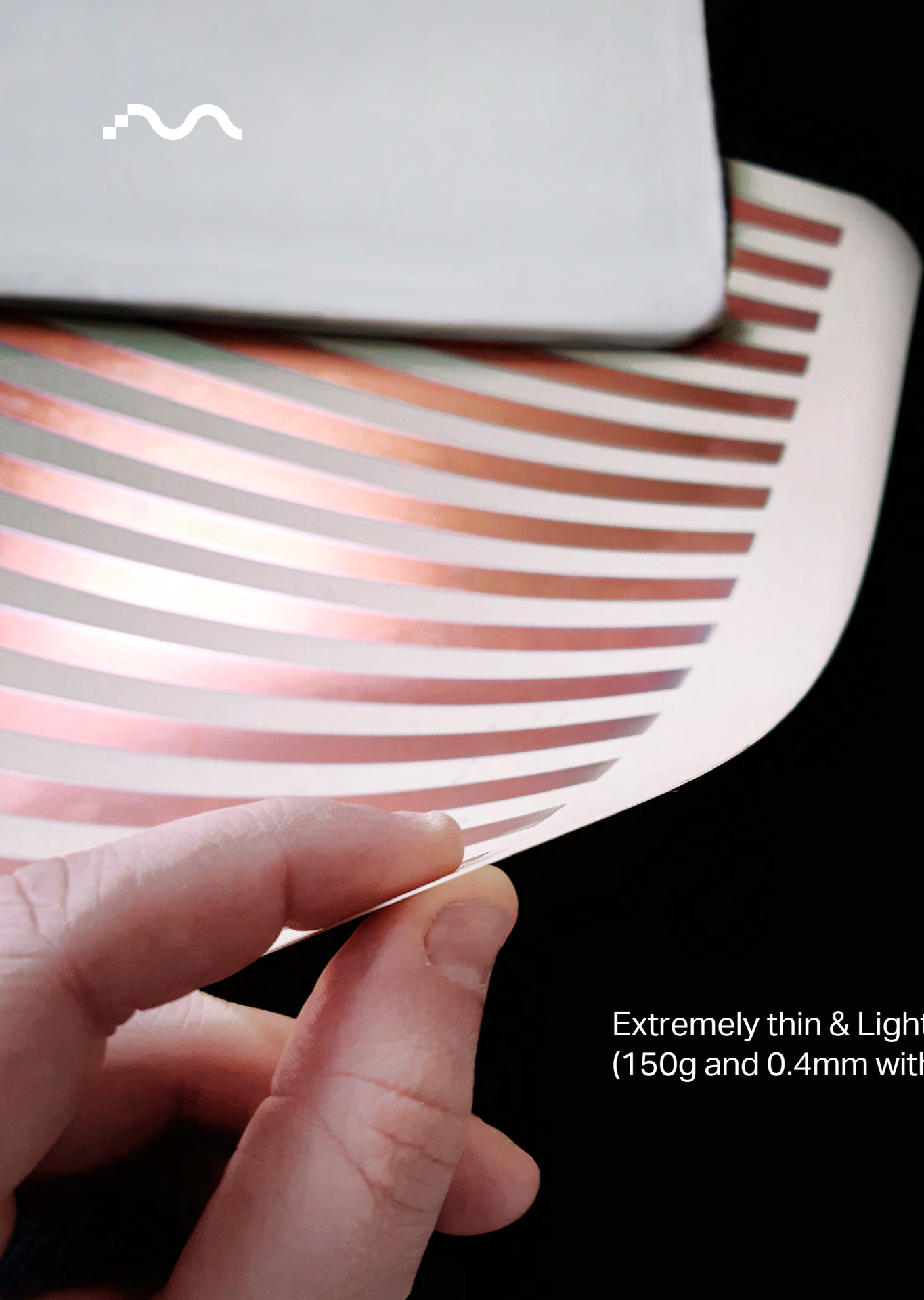
Technology fully compatible with existing MRI scanners.

**Confirmed Class-I device by French National Agency for the Safety of Medicines and Health Products (ANSM)**





## Technology specifications



Extremely thin & Lightweight  
(150g and 0.4mm without a cover)

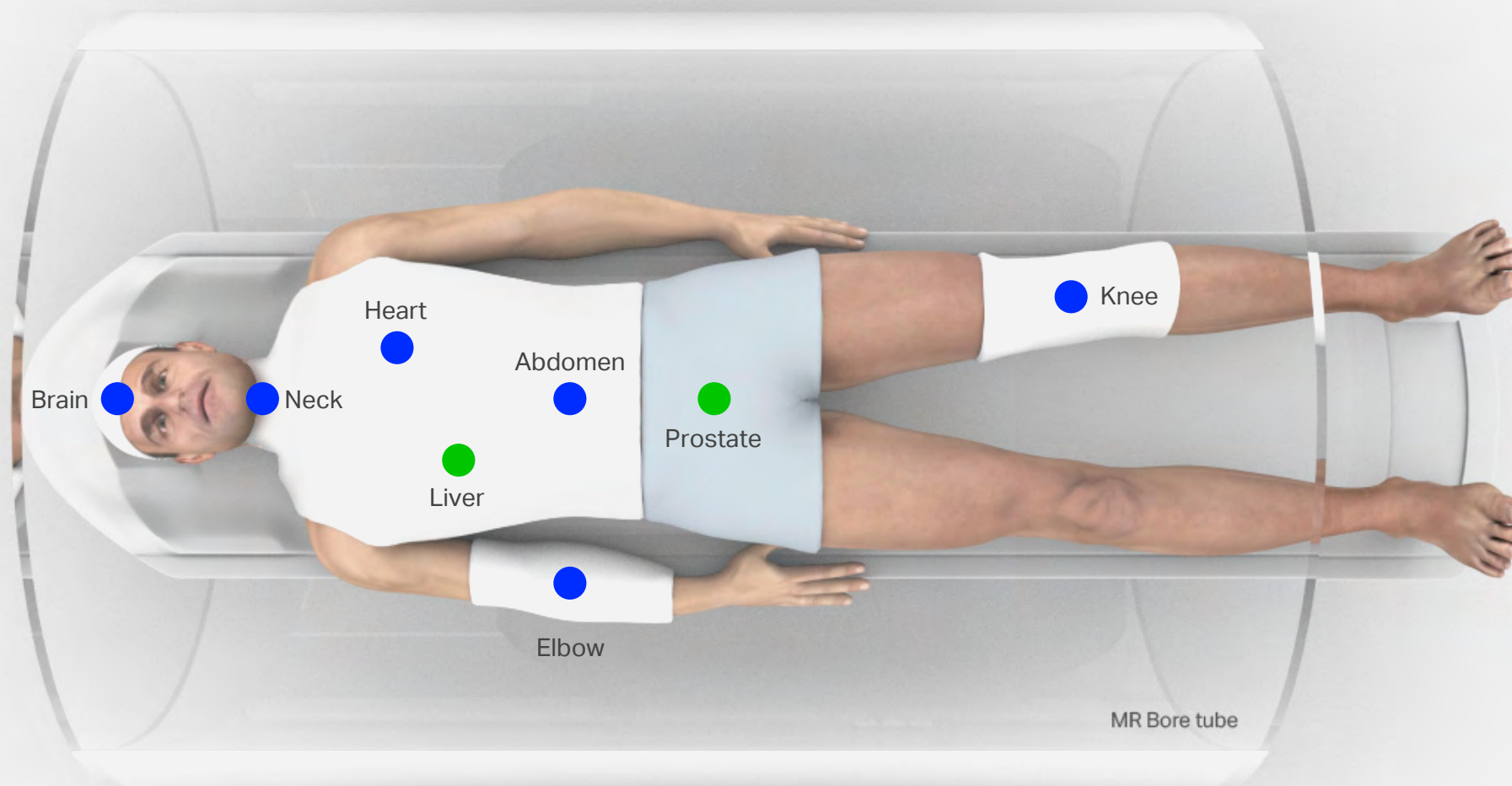


Fully bendable and Robust





# WearMe™ development plan & TAM



WearMe™ 

Targeting all organs at all field strengths

1.5T 3T 7T

- Tested for prostate and liver imaging on clinical 3T scanners with existing receive coils
- In development for other organs in various field strengths

ADDRESSABLE MARKET

**40,000** scanners worldwide



# Competitive Landscape

## Coil manufacturers

MRI Tools, Rapid biomedical, QED, Tesla Dynamic Coil, Nova Medical, Invivo Group

## Original Equipment Manufacturers

Siemens, GE, Philips, Canon, United Imaging Healthcare

## DIFFERENTIATOR

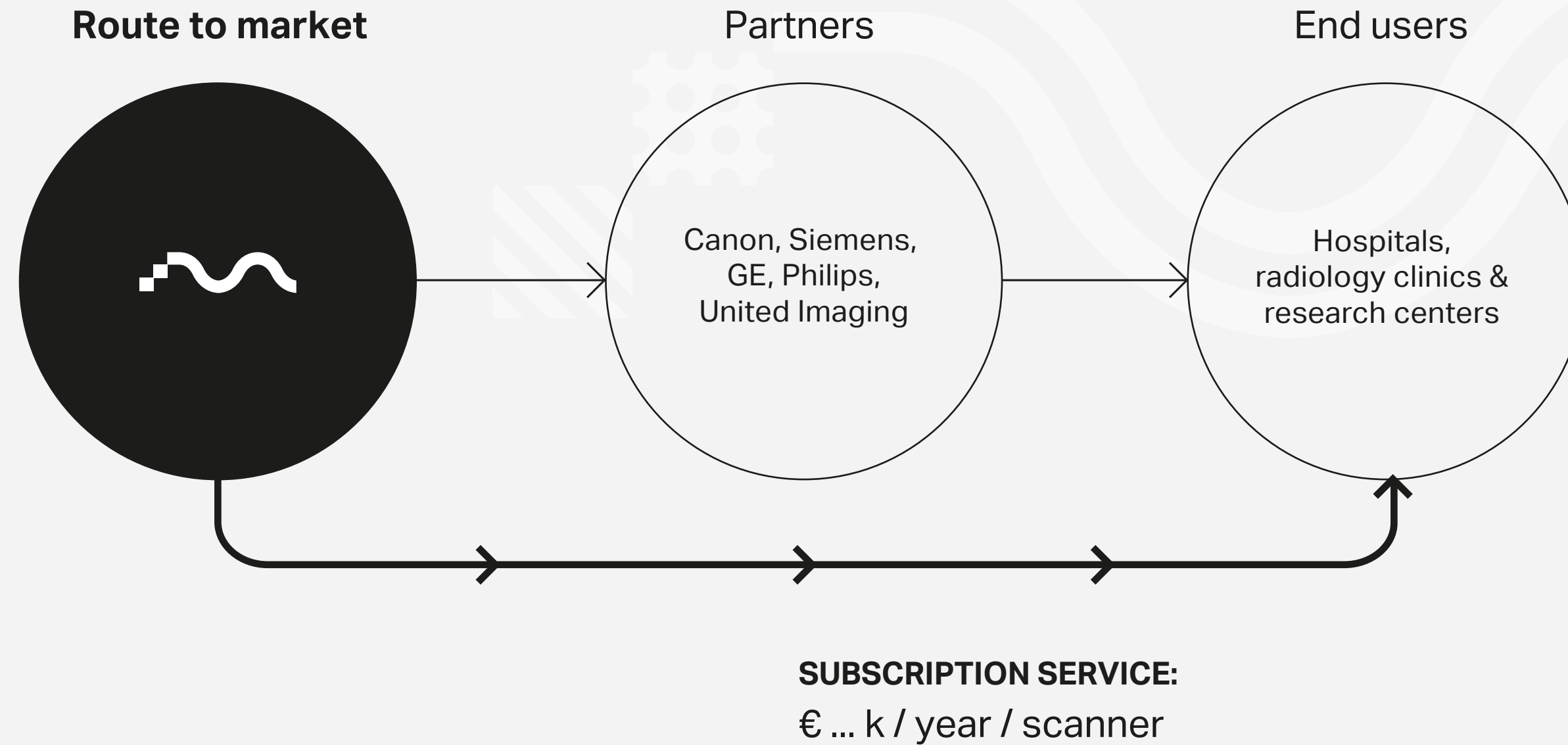
Multiwave Imaging is the only company bringing to market

**The first lightweight, wearable, wireless metamaterial RF device to reduce MRI scan time**





# Business model





# Benefits for partners and end-users

## For hospitals / OEMs

- 25% increase in patient throughput
- Additional €5.2M revenues per scanner over 10 years
- Quicker amortization of MRI scanner
- +5% market share for OEMs within 5 years

## For patients

- Up to 50% reduced scan time
- Leading to up to 25% reduced wait times
- Earlier diagnosis of disease and follow up
- Improved health insurance coverage

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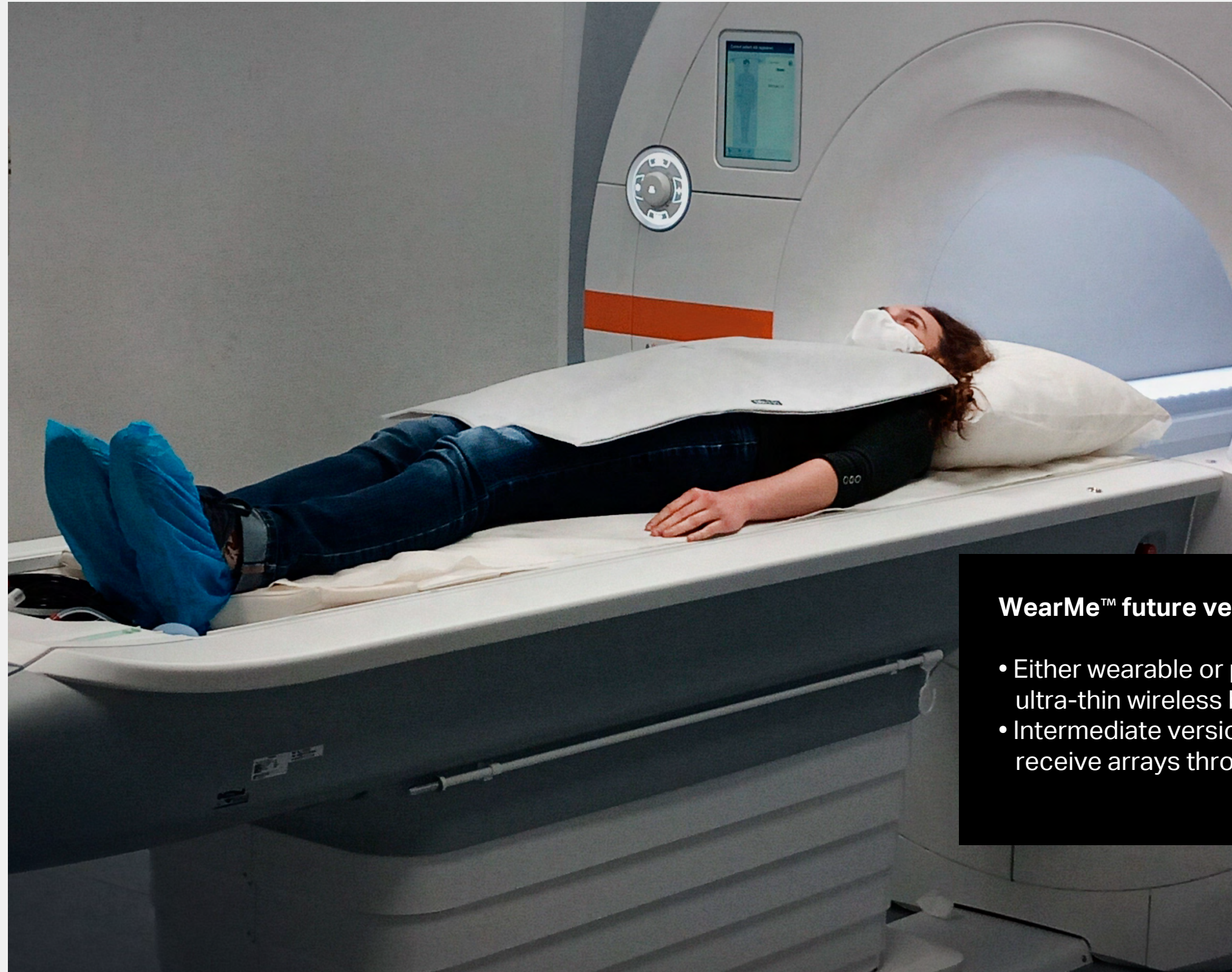
### Assumptions:

- 261 working days/year
- Present throughput: 16 patients/ day/ scanner
- WearMe™ throughput: 20 patients / day/ scanner
- Average cost of MRI scan: €500
- €522k additional revenues/ scanner/ year
- Over €5.2M in new revenues over 10 year average MRI scanner lifetime due to WearMe™

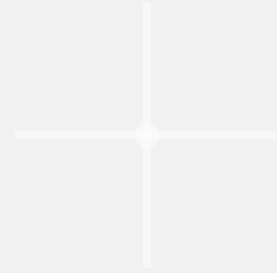




## R&D Future developments



- WearMe™ future version to fully replace existing arrays**
- Either wearable or printed on flexible substrate or used as ultra-thin wireless blanket (depending on economic model)
  - Intermediate version could be embedded inside existing receive arrays through collaboration with OEMs

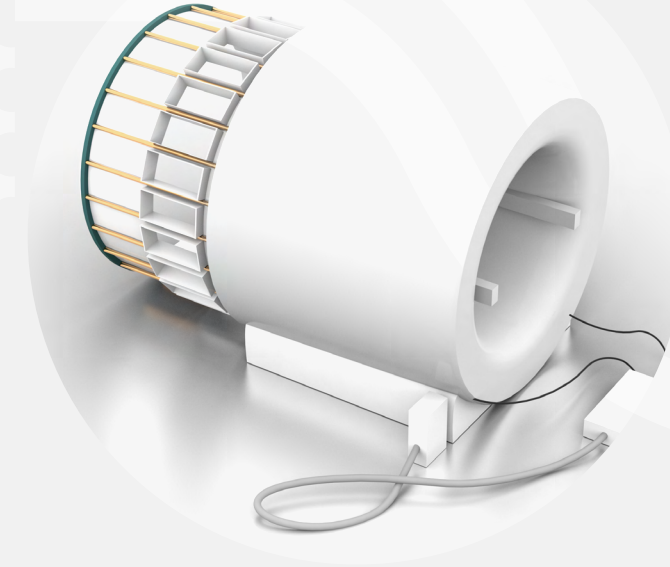


## Track record in 7T Technologies: H2020 M-Cube project legacy



### Dielectric pads **7T**

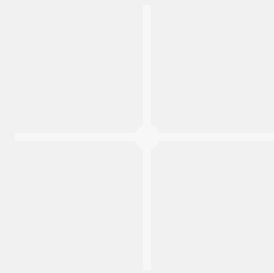
- CE Marking awarded February 2021
- Already sold to 30 hospitals and clinics
- Subscription model €2k/pad/year
- Official vendor of Philips Healthcare (audited by Philips Healthcare)
- Partnerships with GE (Milwaukee) on going & Siemens



### M-One **7T**

- €800k financing from EU project (2020-2021)
- Metamaterial inside brain coil to address image inhomogeneities in 7T imaging
- Expected pricing €200-300k/ coil





# Core team



**Panos Antonakakis**  
President



**Tryfon Antonakakis, PhD**  
Board member



**Marc Dubois, PhD**  
CEO

- MRI researcher @ CRMBM/ Institut Fresnel
- Researcher @ U.of California, Berkeley
- PhD physics @ Institut Langevin



**Elodie Georget-Paris, PhD**  
COO

- 4 years @ Multiwave Imaging
- 2 years @ CEA Neurospin
- PhD physics @ Aix-Marseille University



**Zo Raolison, PhD**  
Head of quality

- 3 years @ Multiwave Imaging
- 1.5 year @ CEA Neurospin
- 4 years @ Dassault Aviation
- PhD Physics @ IPCMS Strasbourg



**Megdouda Benamara, PhD**  
MRI coil Engineer

- 3 years @ Multiwave Imaging
- PhD Electrical Engineer @ Paris Est



**Sajad Nezhadian, PhD**  
MRI coil Engineer

- MRI researcher @ Yale University
- Post-doctoral MRI researcher @ Yale University
- PhD Imaging and medical physics @ Université Paris-Sud



## A team of renowned advisors



**Andrew G. Webb**

Professor Andrew G. Webb is a professor of MRI Physics and Director of the C.J. Gorter Center for High field MRI at the Leiden University Medical Center.



**Tarek Hijal**

Dr Tarek Hijal is director of the division of radiation oncology of McGill University Health Centre and assistant professor in the department of oncology at McGill University.



**Gerard Friedlander**

G rard Friedlander, MD, PhD, is the Dean of Paris Descartes University School of Medicine. Prof. Friedlander is the head of the department of physiology at Georges-Pompidou hospital.



**Stefan Enoch**

Stefan Enoch is a CNRS research director and Vice President for Science and Technology at Aix-Marseille University. Stefan is a member of the European Academy of Sciences and Director of Marseille Imaging.



**Richard Craster**

Professor Richard V. Craster is the Dean of the Faculty of Natural Sciences at Imperial College London. He is also the director of the CNRS-Imperial "Abraham de Moivre" joint research institute. Previously he was Head of Department of Mathematics at Imperial College London for 6 years.



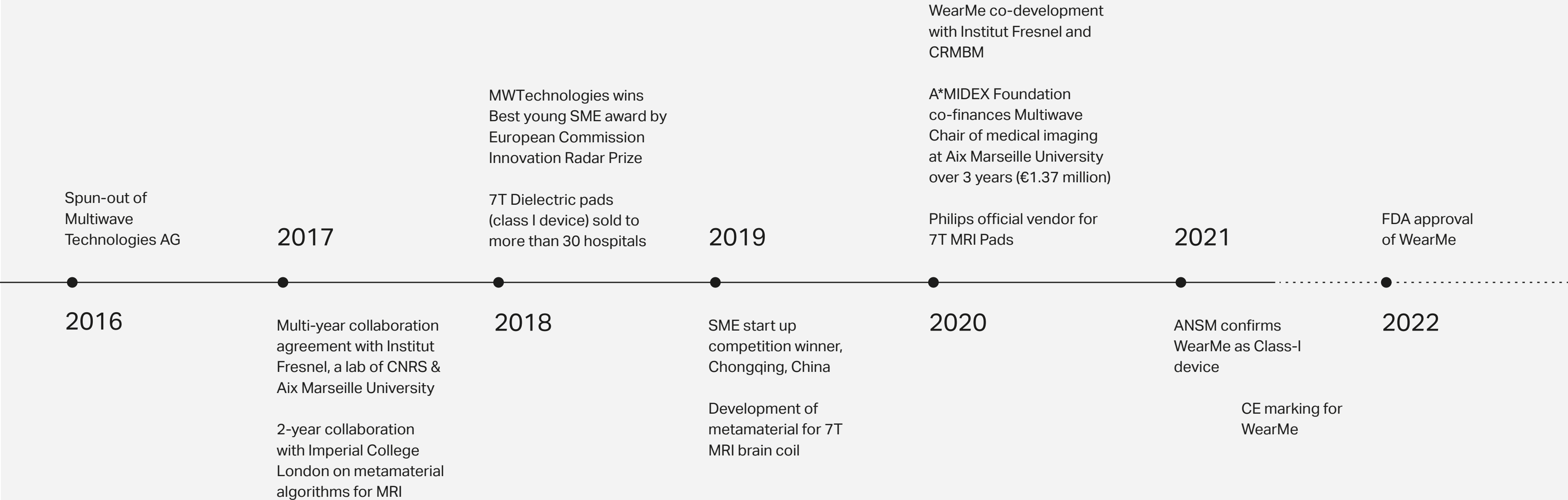
## Partnerships

We work with leading academic partners to co-develop IP in the field of metamaterials & medical imaging

- European Center for Research in Medical Imaging (CERIMED)
- Leiden University Medical Center
- Imperial College London
- Center for Magnetic Resonance in Biology and Medicine
- Institut Fresnel
- ITMO St Petersburg
- Bioatriki Healthcare Group
- McGill University
- Aix Marseille University
- French Atomic Energy Agency-Neurospin
- I3M Group of Detectors for Molecular Imaging (Valencia, Spain)
- French National Research Center (CNRS)
- Catholic University of Louvain
- Utrecht University Medical Center



# Roadmap







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