Enabling the future of neural implants

>£800k in Grants/Subsidies Secured

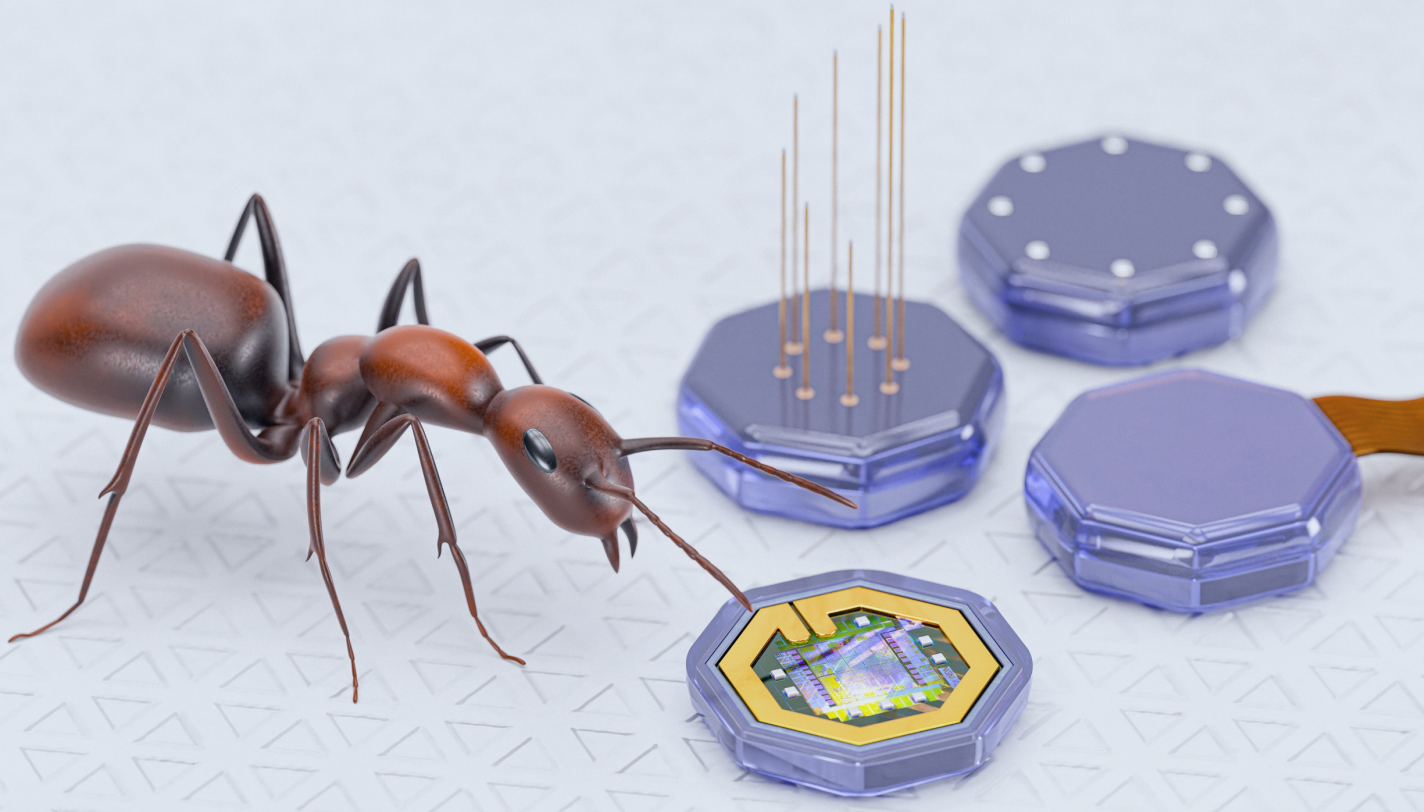
- NIHR i4i PDA grant (£426k direct funding)
- Innovate UK Smart grant (£303k direct funding)
- BC Neurotech Accelerator (IUK, £10k MFA)
- ChipStart UK Incubator (UK Gov, £62.5k MFA)

Raising £750k Pre-Seed Investment

- £225k committed by ICEF fund and MTSC fund
- MVP development, tech validation in-human, IP expansion, and business development

mintneuro

Scalable.
Integrated.
Less invasive.



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>1 billion people

worldwide suffer from neurological disorders [1]

£120 Bn per year

are spent on brain related disorders in the UK alone [2]

1 in 6 deaths
1 in 4 disabilities

are caused by neurological conditions [3]

[1] “Neurological disorders affect millions globally: WHO report”. World Health Organization, 2007.
[2] “The global burden of neurological disorders”. The Lancet Neurology, 2019.
[3] “The size, burden and cost of disorders of the brain in the UK”. Journal of Psychopharmacology, 2013.

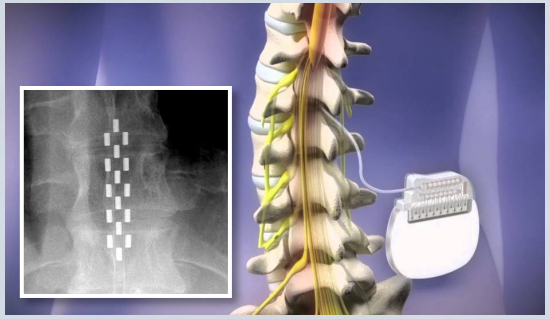
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Established neural implants

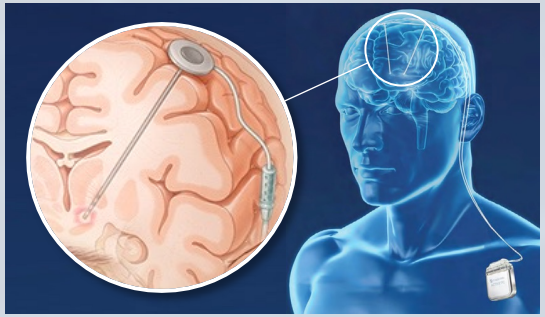
Cochlear implants
enable over 1m people with hearing impairments to perceive sound



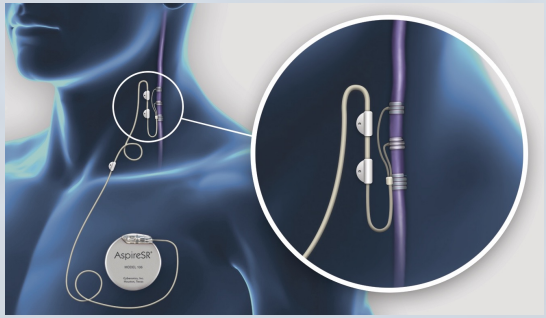
Spinal cord stimulators
provide vital relief for chronic pain by altering pain signals to brain



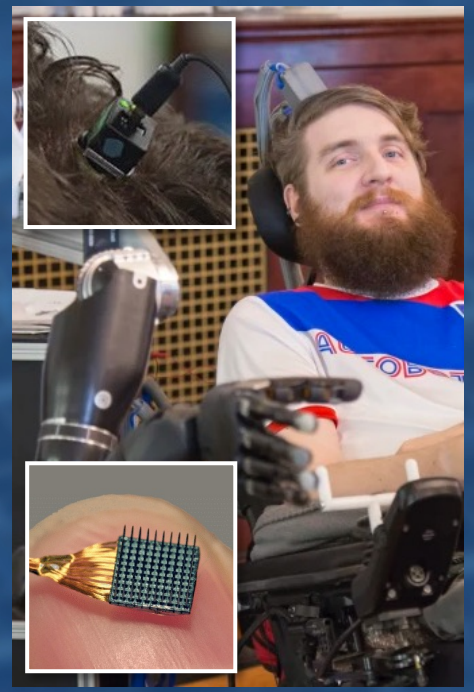
Deep brain stimulators
reduce movement symptoms for Parkinson's and essential tremor



Vagus nerve stimulators
reduce seizure frequency and severity for drug-resistant epilepsy



Brain-computer interfaces
to restore movement in paralysis and communication in speech impairments by translating brain activity into digital commands



Bioelectronic medicines
to modulate the nervous system to offer treatments for various conditions, from autoimmune diseases to mental disorders



Emerging implantable solutions

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Limitations



Large and inefficient

Implantable devices are bulky, often based on outdated technology that **limits functionality and performance**



Complex surgeries and risks

Implantation surgeries are lengthy, complex, and carry inherent risks, **requiring high surgical expertise and reducing adoption**



Costly and slow production

Producing and distributing new devices remains **expensive and lengthy**, needing >$100m and >10 years **to reach market**

Needs

Advanced miniaturization

Small, low power, and integrated devices based on modern tech would **improve functionality, efficiency, and reliability**



Minimally-invasive techniques

Less invasive interventions and outpatient surgery would **reduce patient risks and time of implantation and recovery**



Cost-effective production

Scalable and high-volume manufacturing would **reduce production lead time and costs**, ultimately **increasing accessibility**



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Semiconductors

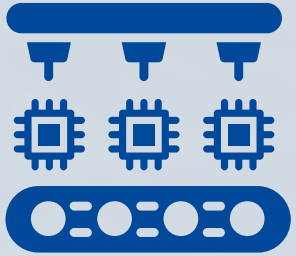
The key to advancing the neural implants industry

- **Massive production scale**
  Unique capabilities (>1.2 Tn chips in 2022)
  >> enabling low-cost and wide adoption

- **Rapid market growth**
  Industry value at $600b with CAGR of 6-7%
  >> fast advancements and market expansion

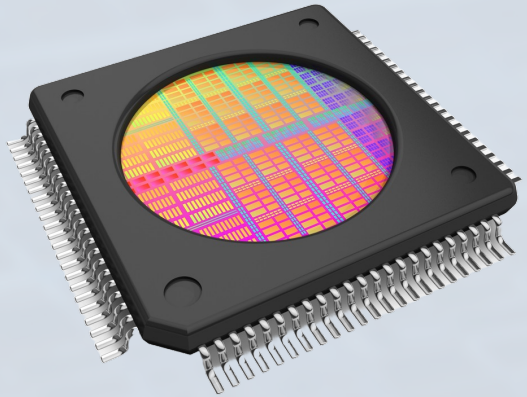
- **Diverse applications**
  Microchips are critical in countless sectors
  >> high versatility, from A.I. to automotive

- **Innovation hub**
  Investment in R&D over $60 billion annually
  >> cutting-edge innovations at high-rate



Scalable manufacturing

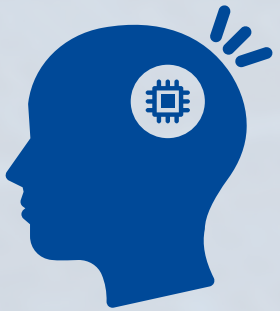
The ability to rapidly produce high-quality, reliable chips at scale makes neural implants **more available and affordable**





Micro-scale integration

High-density semiconductor integration allows for **ultra-compact, low-power, and high-performance** implants



Surgical innovation

More precise and less invasive devices reduce surgical risks and recovery time, translating to **better patient outcomes**

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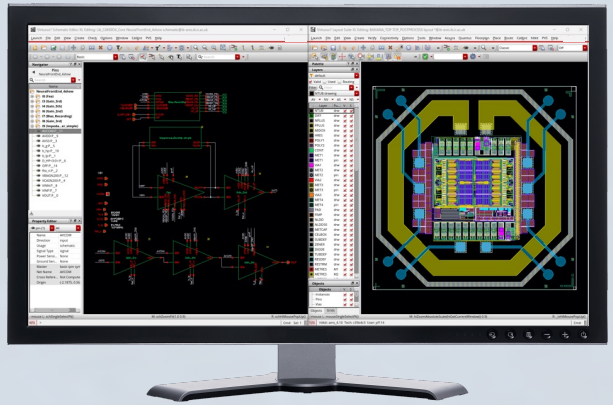
mintneuro

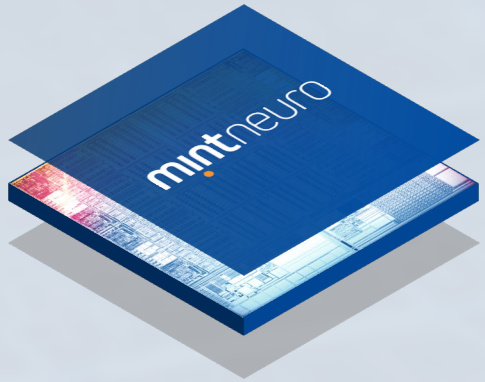
Our mission is to improve the lives of people affected by neurological conditions

We are developing **medical-grade integrated devices** to enable **smaller**, **less invasive**, and **more accessible** neural implants

Empowering neural implants

with advanced semiconductor technology

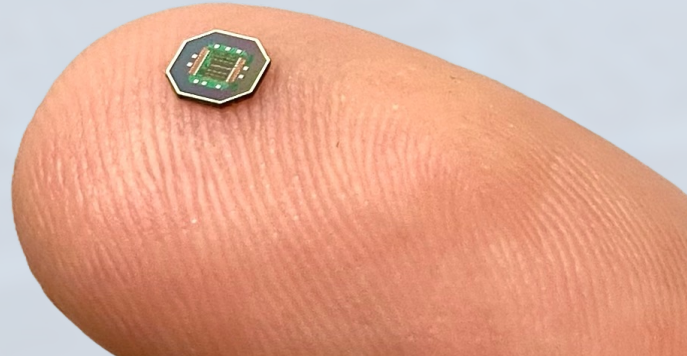




Efficient solutions.
Compact design.
Medical quality.

Neural functions:

- front-end neural interfacing
- neural signal processing
- wireless connectivity
- power management
- system control
- data storage



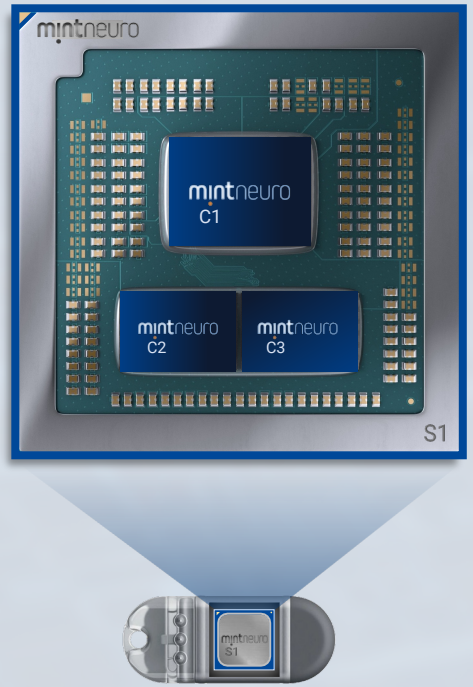
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Our innovative approach

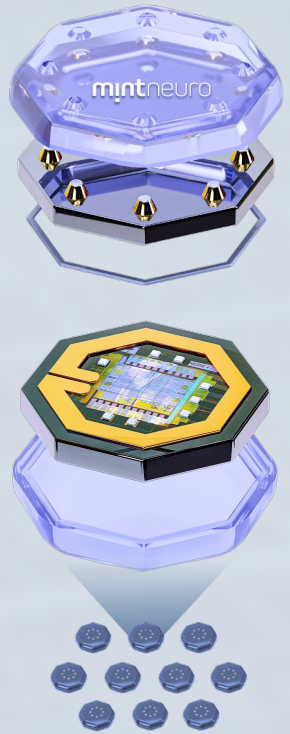
Integrated Circuits



Integrated Systems



Integrated Implants



increasing integration, functionality, reliability – reducing size, power, complexity

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Uniquely qualified team



Dorian Haci
CEO
Imperial College London

- **10 years** in neural implants & medtech venture building



Tim Constandinou
CTO
Imperial College London

- **20+ years** in medical chips & implantable neurotechnologies



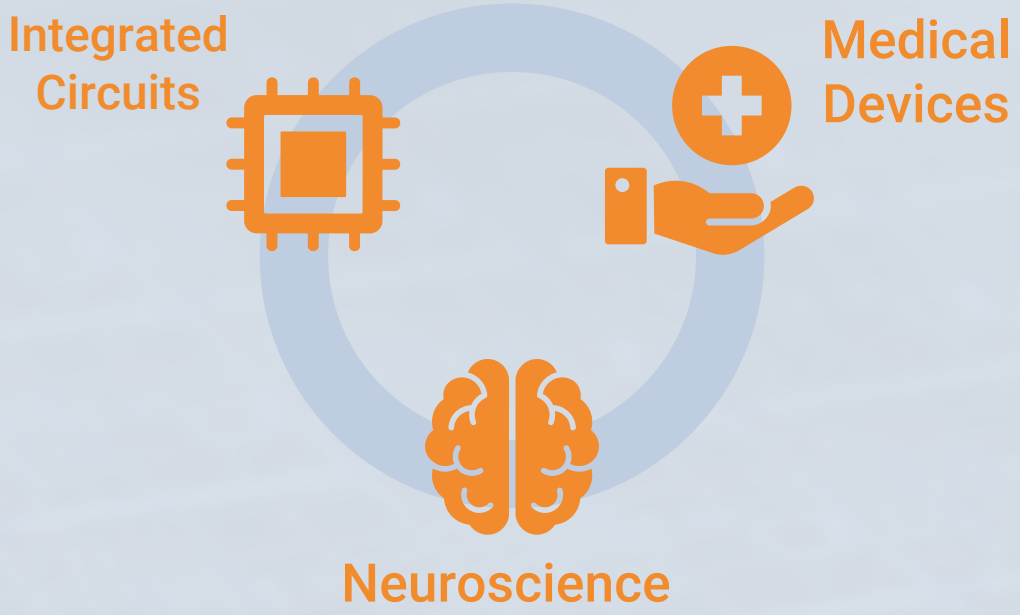
Andy Jackson
CSO

- **20+ years** in neuroscience & brain-computer interfaces



Tim Denison
Chair

- **20+ years** in semiconductors & implantable medical devices



R&D and translational team:

Kasia Szostak
Regulatory Affairs

Adrien Rapeaux
Neural Engineering

Jonathan Casey
Product Quality

Peilong Feng
Wireless Technology

Ian Williams
Research & Development

Matthew Cavuto
Mechanical Engineering

Andrea Mifsud
Integrated Circuit Design

Martin Lombard
Research & Design

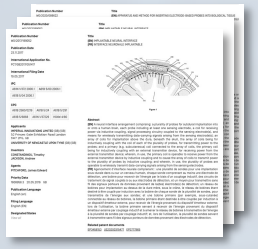
Advisors:

Konstantin Nikolic
David Skellern
Antonio Valentin
Ioannis Stavropoulos
Will Muirhead
Chris Toumazou
Carlo Guareschi

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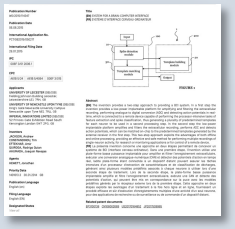
Spinout from
Imperial College
London

Protected intellectual property



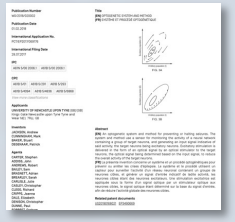
Implantable neural interfaces and implantation

Protected in UK, US, and EU



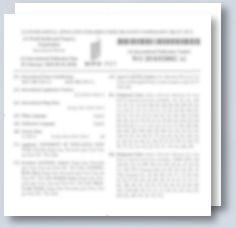
Front-end system for brain-computer interfaces

Protected in UK, US, EU, and Japan



Optogenetic method for closed-loop neuromodulation

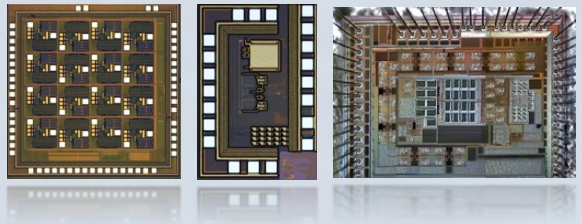
Protected in US and EU



Architecture and System-in-Package for neural chipsets

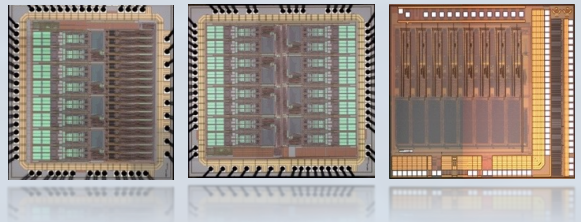
Drafting applications for filing

Knowhow in neural chip design



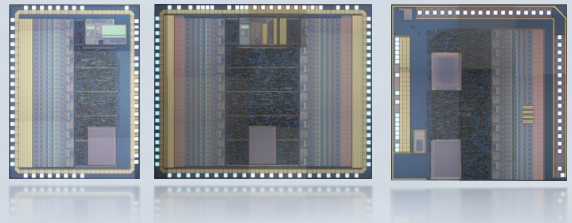
1st GEN – 2012

Analog front-end circuits:
- electrical sensing
- electrical stimulation



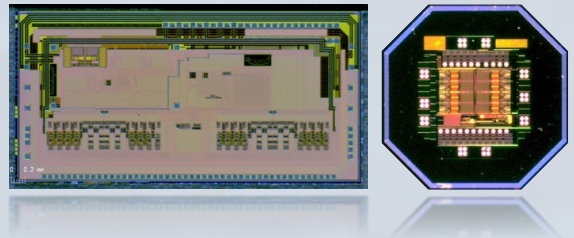
2nd GEN – 2014

Multi-channel neural chips:
- neural sensing (32-ch)
- neural stimulation (8-ch)



3rd GEN – 2016

Modular circuits for neural interfacing:
- 8/16/32/64-ch smart neural sensing
- 32-ch bidirectional chip (sense + stim)



4th GEN – 2018-2021

Systems-on-Chip for neural implants:
- SoC for wireless distributed sensing
- SoC for optogenetic epilepsy treatment

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Traction



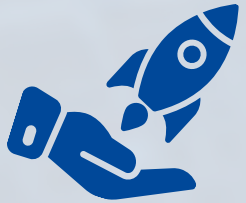
A decade of R&D at Imperial College London

access to £10m facilities at the Next-Generation Neural Interfaces lab for design and prototype of neurotech



Over £4m underpinning research funding

academic grants leading to 50+ related papers and 4 patents



£300k translational and enterprise funding

supporting founder training, venture building, and spinout process

MedTech SuperConnector™ — July 2020 – June 2021

Royal Academy of Engineering — July 2021 – June 2022

Biomedical Catalyst Neurotech Accelerator — July 2023 – Dec 2023

CHIP START UK the semiconductor incubator — October 2023 – Ongoing

Venture ecosystem support

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Clinical & Product validation



FUNDED BY NIHR

First-in-Human Study

- **£1.4m NIHR PDA** collaborative grant
- 3-year project (Q1 2023 – Q4 2025)
- Epilepsy neuromonitoring device powered by mintneuro sensing chip



FUNDED BY UKRI Innovate UK

Minimum Viable Product

- **£625k IUK Smart** collaborative grant
- 2-year project (Q2 2024 – Q1 2026)
- Next-gen neural implant technology for advanced bioelectronic therapies

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Untapped market opportunity

- **Costs of neurological conditions**
  estimated globally **over $3 Tn** per year, with only half of the them on direct healthcare service

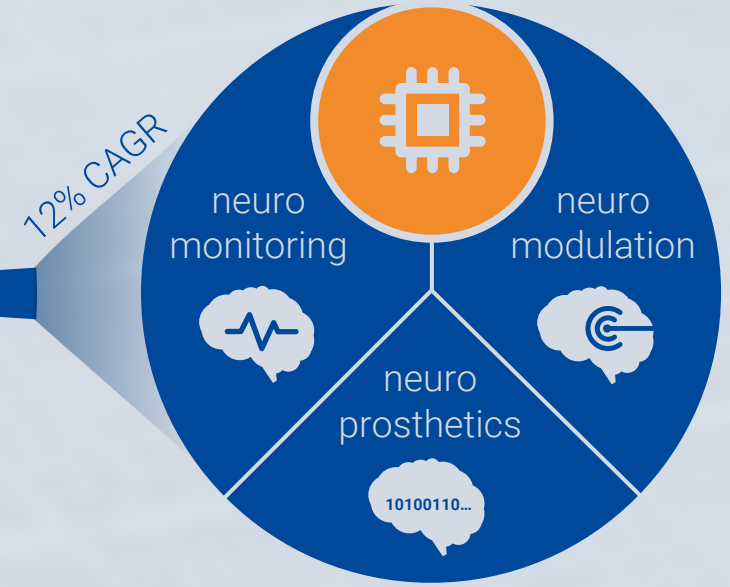
  "The total cost of neurological disorders in Europe is, equivalent to the cost of heart diseases, cancer, and diabetes combined."

  – Economist Impact, 2020

- **Neural implant market**
  represents today a modest fraction of costs, but is on the brink of exponential rise, poised to offset both direct and indirect expenses

- **Active electronic components**
  are required in all monitoring, modulation, and prosthetics devices to sense, decode, and stimulate neural signals





Electronic components for neural implants

$1.5 Bn SAM

Neural implants
(neurotechnology segment of active implantable medical device industry)

$12 Bn TAM

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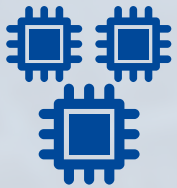
Our business model

Revenue model

	Phase 1	Phase 2	Phase 3
Direct device sales	£100-500 p/u	£100-2k p/u	£100-5k p/u
Customisation NRE fee	£100k-500k	£50k-200k	£10k-100k
Total volume	<10k units	10k-100k units	>100k units
Annual revenue	£1m-10m	£10m-100m	>£100m

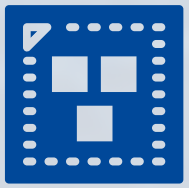
Product line

Phase 1



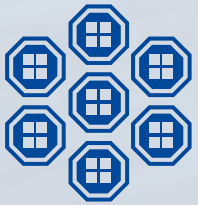
Neural Interface Chips

Phase 2



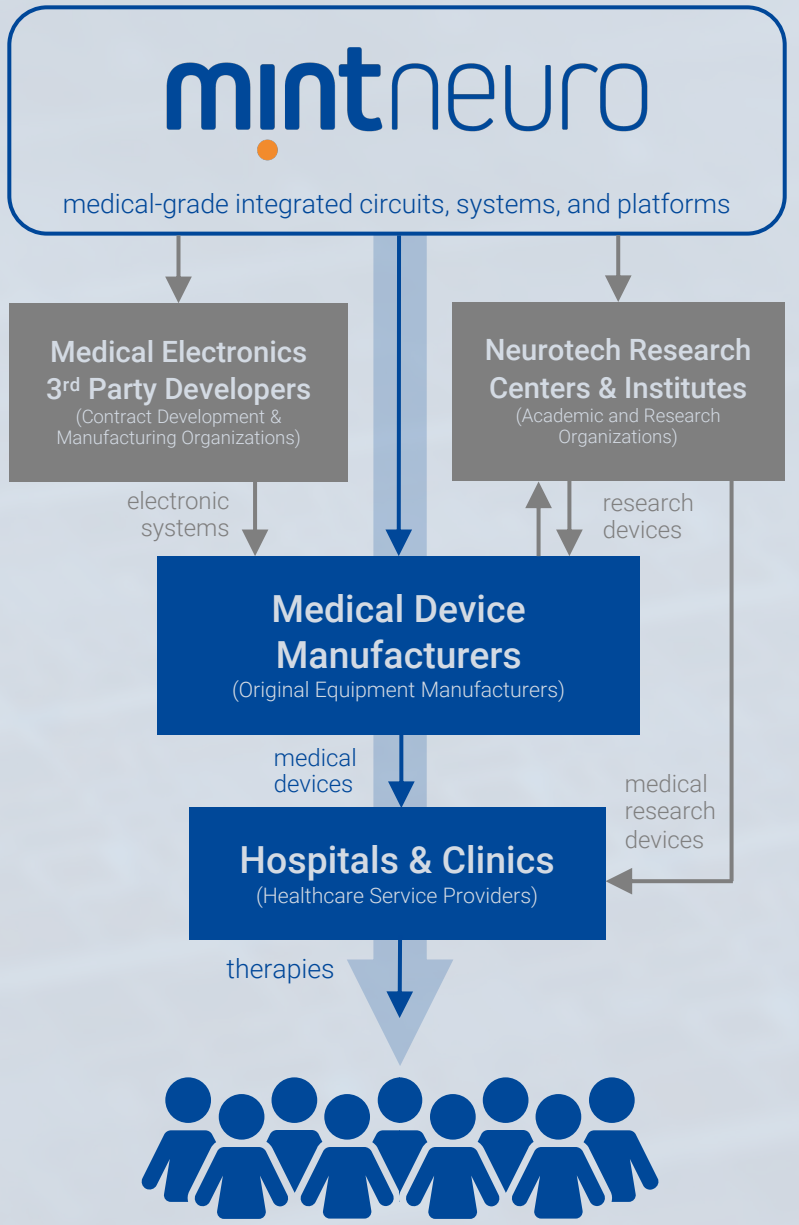
Neural System-in-Package

Phase 3



Neural Implant Platform

increasing integration, functionality, reliability – reducing size, power, complexity



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Customer validation



Interviews conducted with potential customers working in the field of neural implants



Major need for implant-ready chips

- All companies interviewed were seeking **scalable, more capable, and less invasive** implantable devices for interfacing with the nervous system
- Across the industry, a **lack of available integrated circuit components** that are **suitable for implantation** is preventing development of new devices
- Both in-house and outsourced **development of custom chips is too slow and costly**, which increases time-to-market and hinders innovation



Value-Customer hypothesis confirmed

- Customers were **enthusiastic about our unique capabilities**, with many discussing the impact our devices would have on their products
- Our innovative approach was seen as a **significant advancement** on current options, both for **cost/time savings** and **capability improvements**
- Key opinion leaders provided **overwhelmingly positive feedback** on mintneuro's potential and were eager to continue the conversation

Key partnerships

Partnering with customers to fast-track the development of our first product

- We are collaborating with **Amber Therapeutics**, with funding from Innovate UK Smart Grant award (£625k funding)
- This program will develop a **1st chipset**, including sensing and stimulation functions, and our **minimum-viable product**
- The final device will be evaluated in Amber's next-gen neural implant, which acts as a platform for **bioelectronic therapies**

mintneuro + AMBER THERAPEUTICS

In talks with neural implant CDMOs

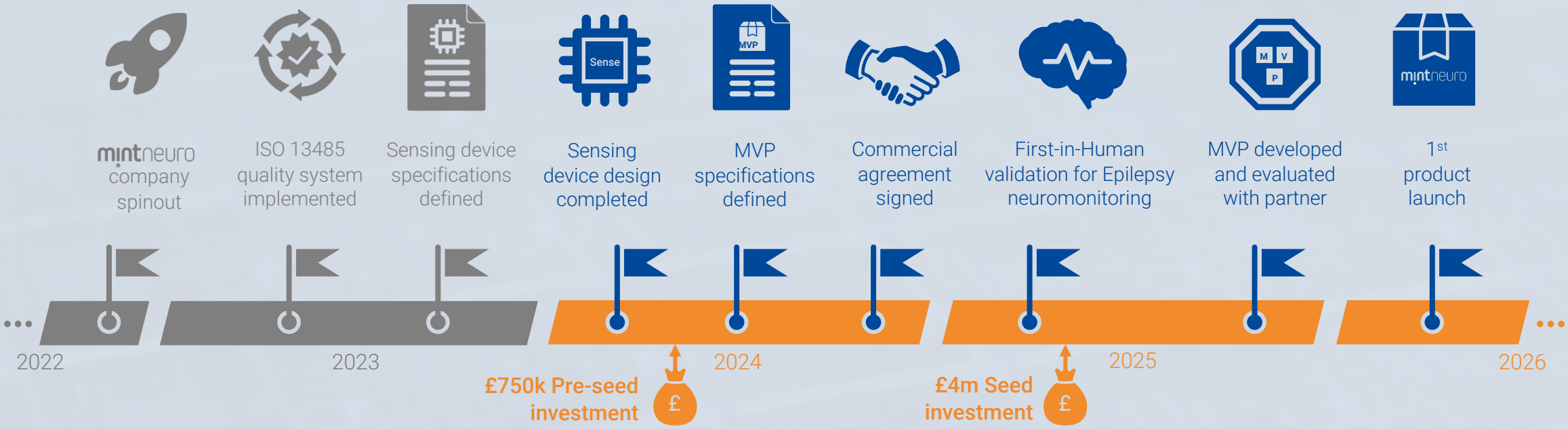
- We have established close relationships with leading CDMOs, widely used as contract developers for new medical devices
- This provides efficient access to their broad OEM customer base and opportunities for co-development of our products

The Technology Partnership

neo-bionica

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Go to market – Phase 1



NIHR National Institute for Health and Care Research | Department of Health & Social Care

DREAM Project – QMS implementation, neuromonitoring system design, FIH validation (£1.4m NIHR i4i PDA grant)

Pioneer | UKRI Innovate UK

BC Neurotech Accelerator

Innovate UK Biomedical Catalyst Feasibility Project (£100k)

Si SILICON CATALYST | Department for Science, Innovation, & Technology

Silicon Catalyst Incubator ChipStart UK (£62.5k MFA)

UKRI Innovate UK

GOLD Project – MVP dev and commercial partnership (£625k IUK Smart grant)

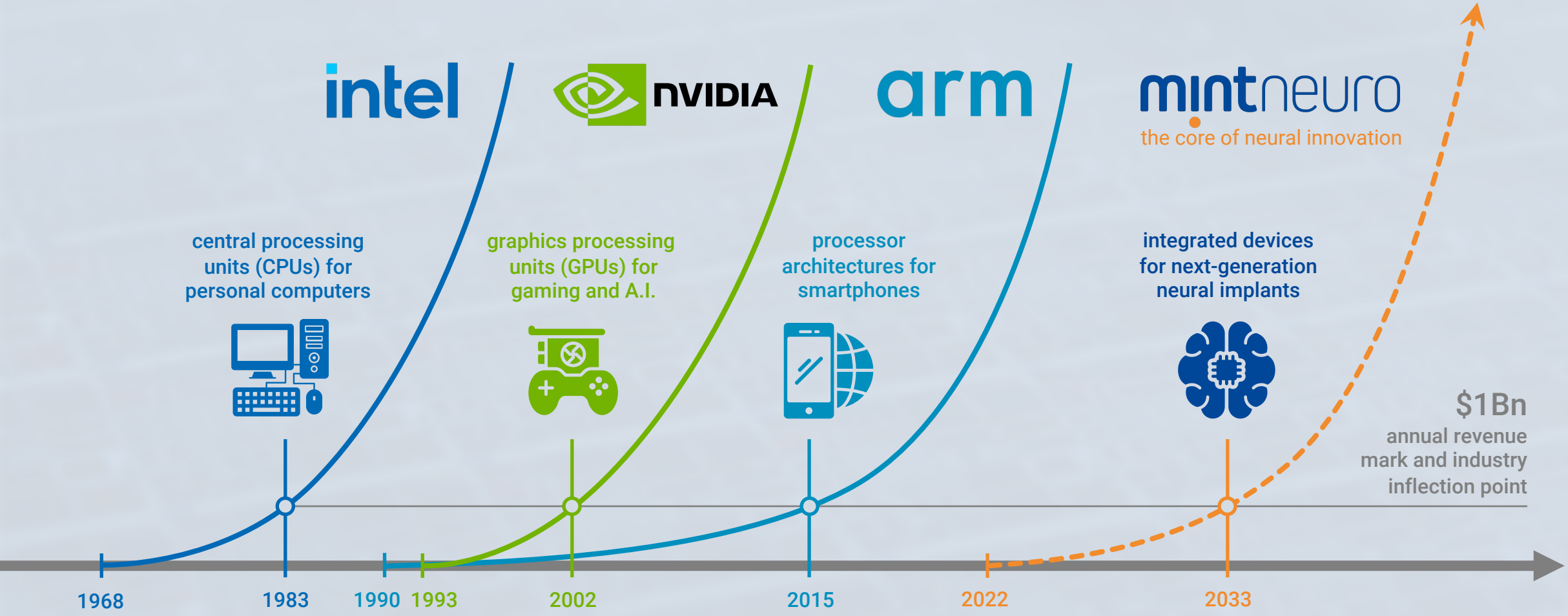
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Competitive advantage and USPs

	medical-grade integrated devices for neural implants	general purpose chips (chip design and manufacturing)	custom medical chips (fabless medical device component/chip design)	in-house custom medical chips (medical implant design and manufacturing)
	mintneuro	Texas Instruments, Analog Devices	Cirtec Medical GmbH, icsense	Medtronic, Neuralink, Abbott
validated for clinical applications	✓ built on circuits designed and validated for human use	X	✓	✓
optimised for neural implants	✓ high-performance and energy-efficient neural functions	X	–	✓
short time to market	✓ rapid development with pre-validated modular blocks	✓	X	X
scalable & low cost	✓ re-use of existing designs of circuits, systems, and IP	✓	–	–
wide range of applications	✓ applicable to multiple customers and use cases	✓	X	X

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Predicting and enabling industry growth



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the core of neural innovation

