

ASML



ASML *well known* A relatively ~~obscure~~ Dutch company (BBC News 2022)

Dr. Mathias Kirchgatter
Research

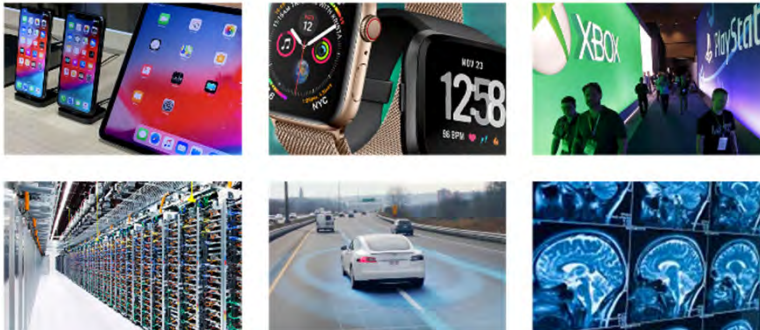
25 October 2023
HTW Berlin

Wer ist eigentlich ASML?

Der unbekannte niederländische Weltmarktführer

ASML is an innovation leader in the semiconductor industry. We provide chipmakers with everything they need – hardware, software and services – to mass produce patterns on silicon through lithography.

Auf gut deutsch: ASML baut Lithografiemaschinen und liefert alles notwendige, damit Computerchips hergestellt werden können –
und ist einer der größten Hersteller weltweit in diesem Bereich



In a nutshell

Lithography systems



EUV lithography systems

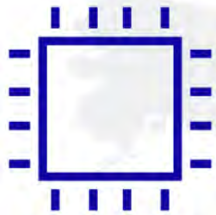
Providing highest resolution in high-volume manufacturing, our extreme ultraviolet lithography machines are pushing Moore's Law forward.



DUV lithography systems

Our deep ultraviolet lithography systems dive deep into the UV spectrum to print the tiny features that form the basis of the microchip.

The world is changing faster than ever before



Connected world

- Smarter cities, factories, homes, cars
- Connecting billions of 'things'
- Unprecedented data volumes
- Privacy in a connected world
- Cybersecurity
- ...



Climate change and resource scarcity

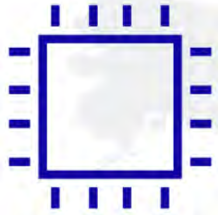
- Rising energy use
- Exploding energy costs
- Accelerating climate change
- More waste and pollution
- Fragile food chains
- Material shortages
- ...



Social and economic shifts

- Rising population
- Higher medical costs
- Faster urbanization
- Need for tech talent
- Deglobalization
- Technological sovereignty
- ...

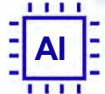
And this industry can help unlock the potential



Connected world



Cloud infrastructure



Artificial intelligence



Hyperconnectivity



Edge computing



Climate change and resource scarcity



Energy transition



Electrification, smart mobility



Agricultural innovation



Smarter use of limited resources



Social and economic shifts



Working, learning remotely



Healthcare, medical tech



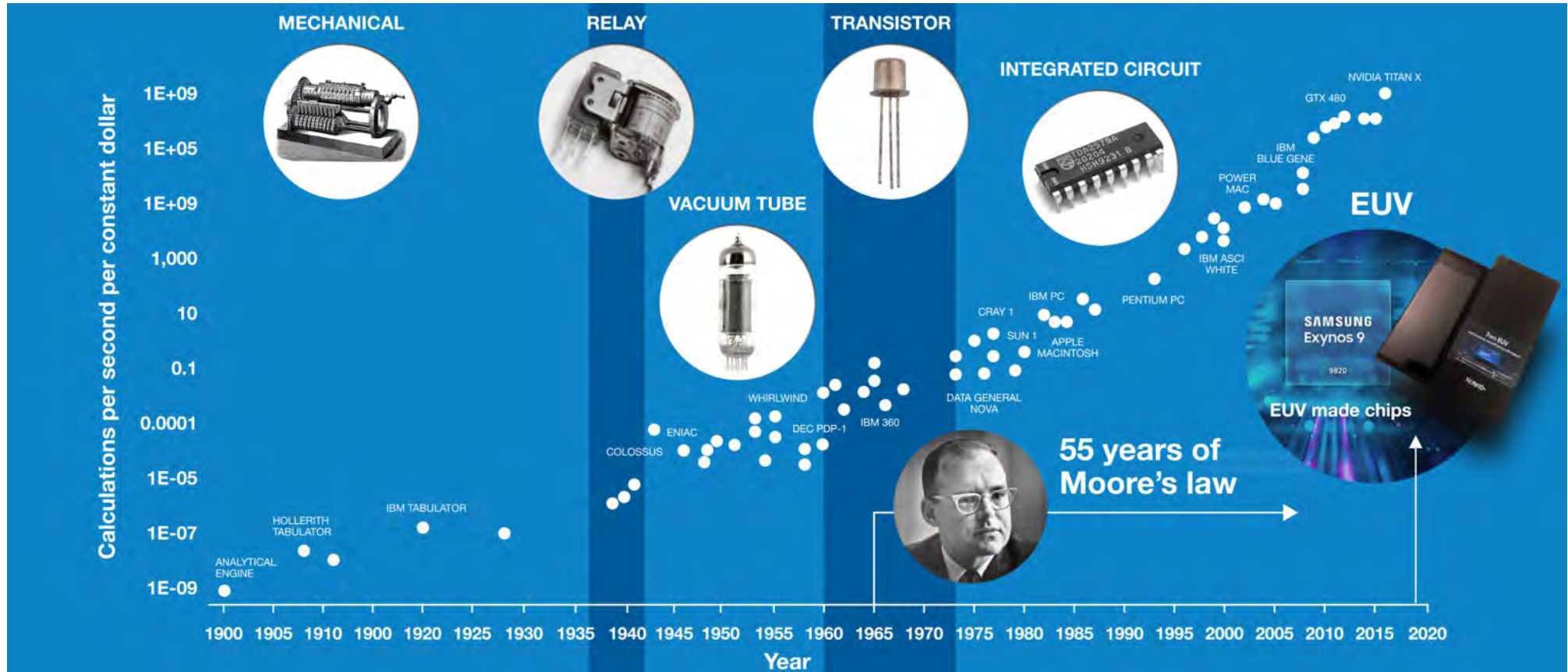
Technological sovereignty



Automation

The world has been improving computer power for 120 years

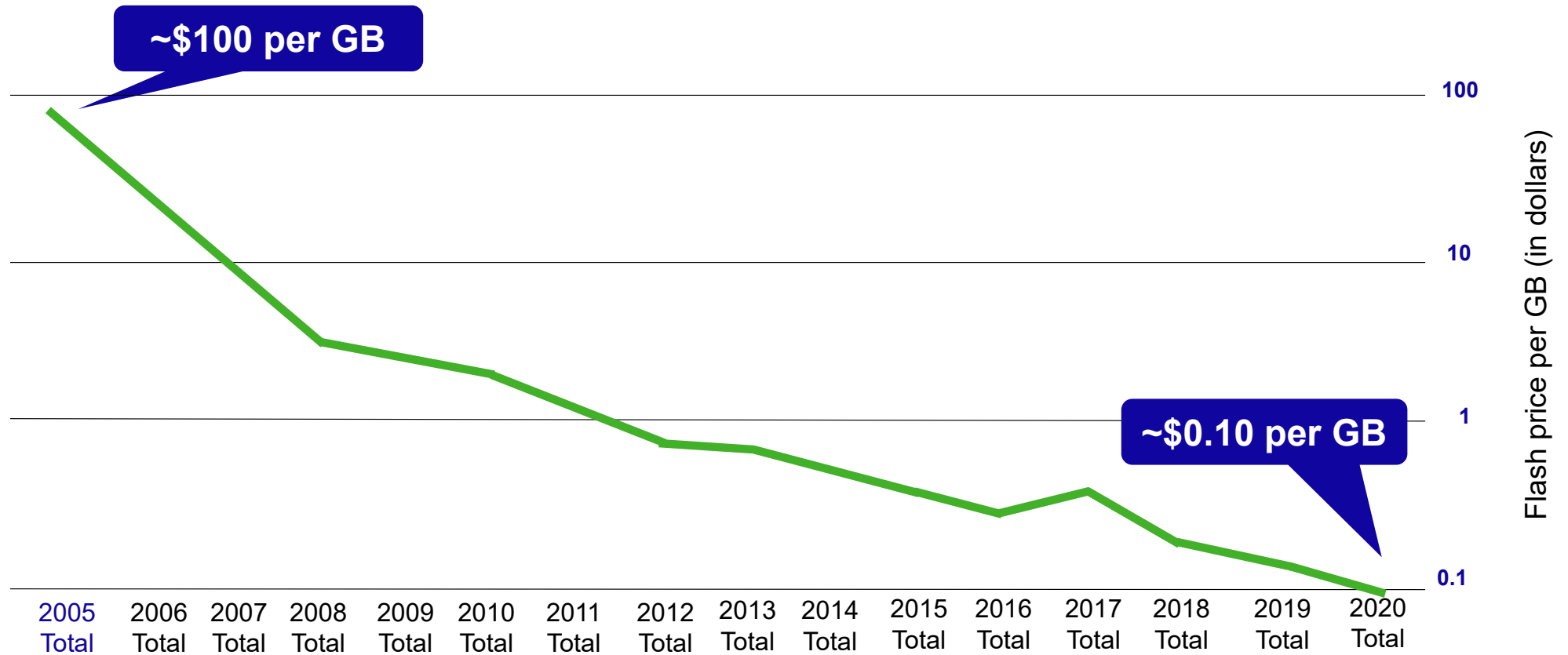
18 orders of magnitude increase of calculation speed per dollar, and continuing



Source: Ray Kurzweil, Steve Jurvetson

Die Komplexität integrierter Schaltkreise verdoppelt sich ca. alle 2 Jahre bzw. deren Herstellungskosten halbieren sich

So Moore's Law makes chips cheaper...



...and electronic devices much more powerful

IBM 5150

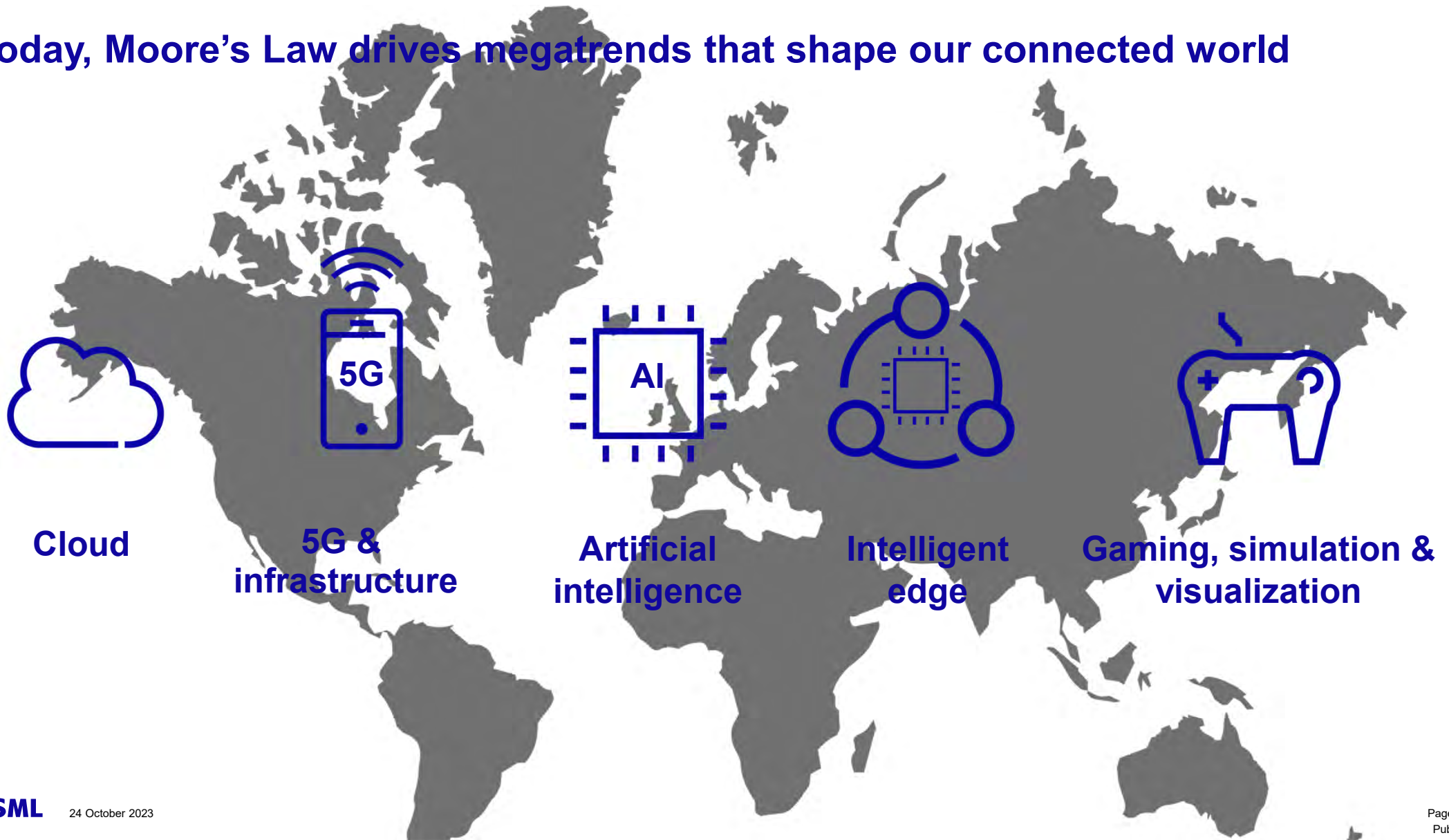


1984	year manufactured	2022
\$1500-\$3000 \$3500-\$7000 today	price	\$1099-\$1599
16-bit Intel 8088 4.77 MHz	processor	Apple A16 bionic chip (4 nm EUV)
16-265 kB	working memory	6 GB
5" floppy disk 160 kB	internal storage	up to 1 TB
640x200 pixels	monitor	2796 x 1190 pixels
29,000	transistor count	16 billion
12.7 kilogram	weight	240 grams

Apple iPhone 14 Pro Max



Today, Moore's Law drives megatrends that shape our connected world



Introducing ASML

Our story begins in the Philips lab in 1984

Humble beginnings make for a strong can-do culture



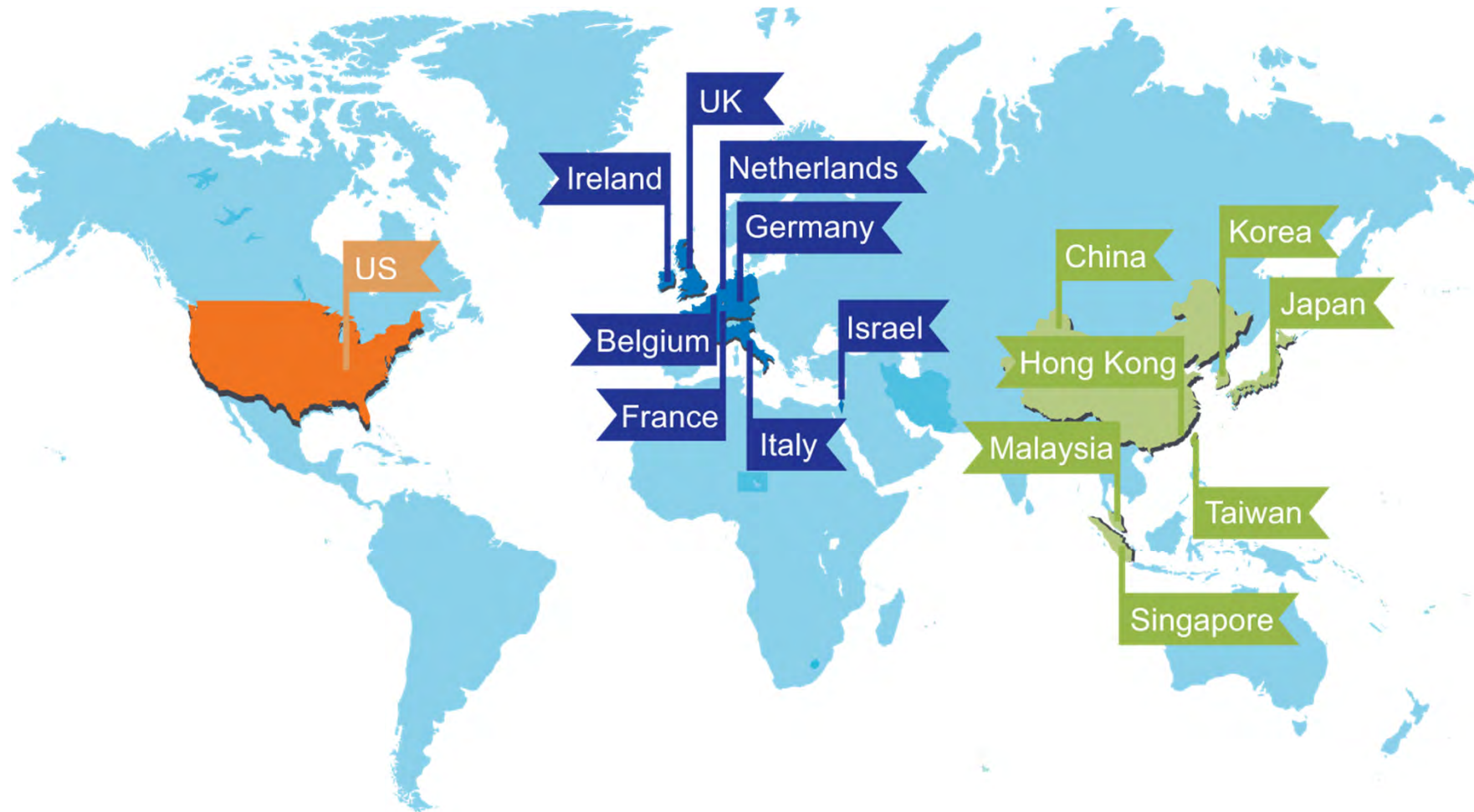
Started as a joint venture by Philips and ASMI

Just 31 employees with a can-do attitude

It took a decade of perseverance to break into the market

A global presence with >41,500 employees (July 2023)

Offices in over 60 cities in 16 locations worldwide



Some of our key industrial sites around the world

Wilton (CT)



Veldhoven



Berlin



Korea



Silicon Valley (CA)



San Diego (CA)



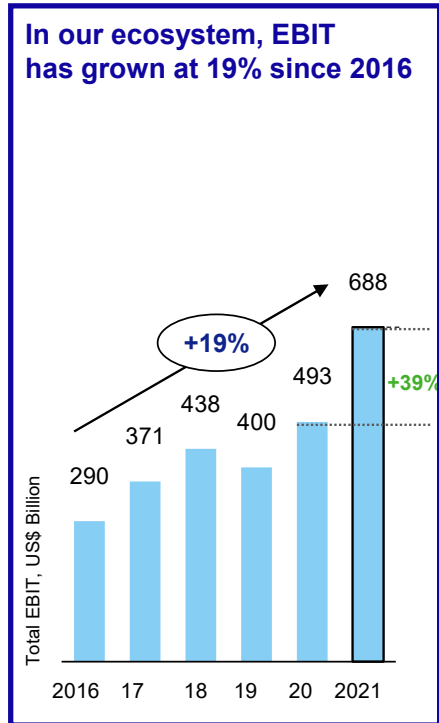
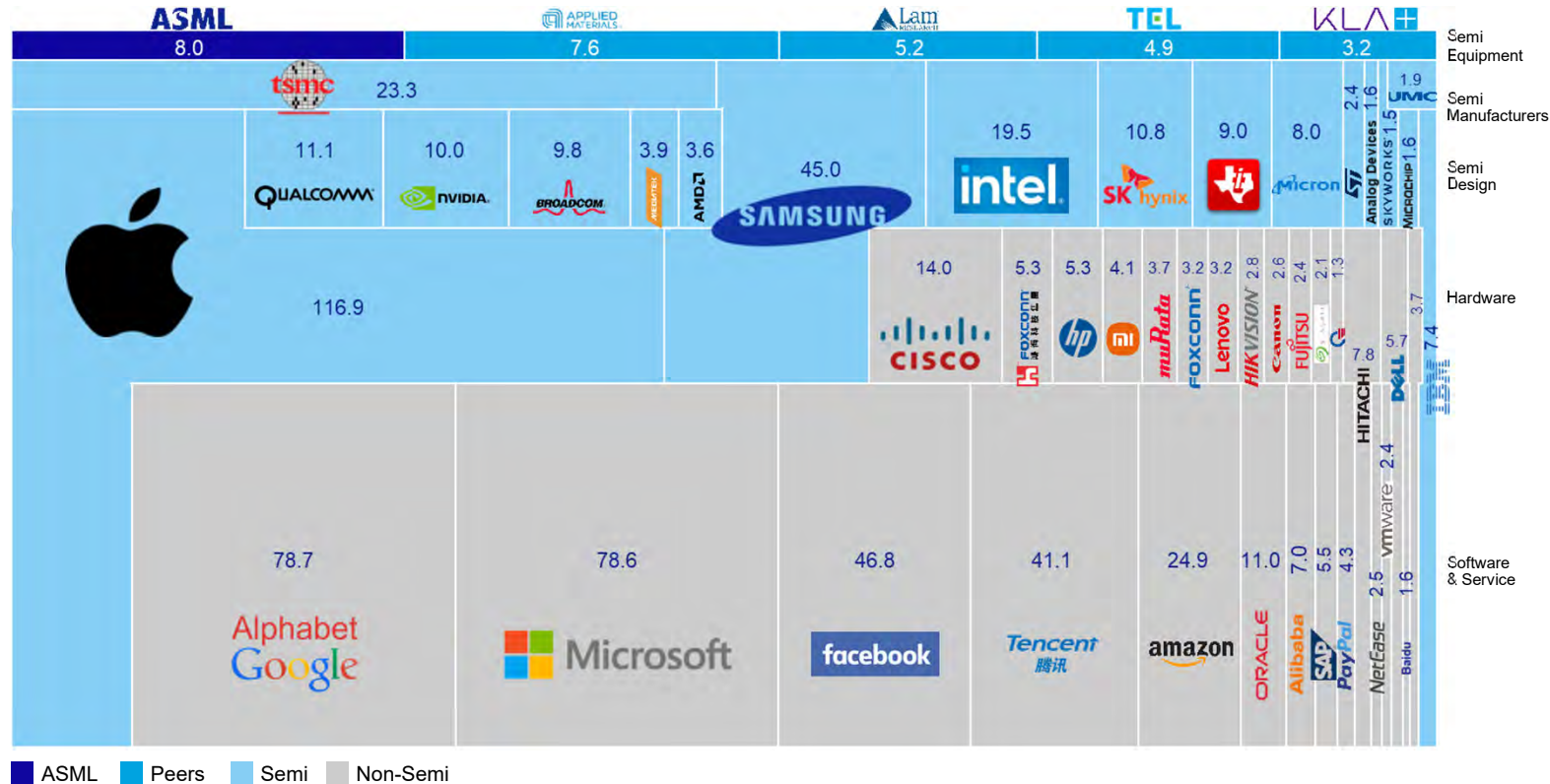
Tainan (Taiwan)



Linkou (Taiwan)

Our ecosystem has considerable means to drive further innovation

50 top technology companies in our ecosystem generated \$688 billion of EBIT in 2021



Source: Bloomberg, companies' annual reports, and ASML analysis. Note: EBIT = Earnings before Interest & Taxes; 50 top companies are top IT companies from the GICS 45 classification, according to EBIT rankings, plus Amazon, which is categorized as a retail company by the GICS (= Global Industry Classification Standard). This chart uses the total EBIT of a company.

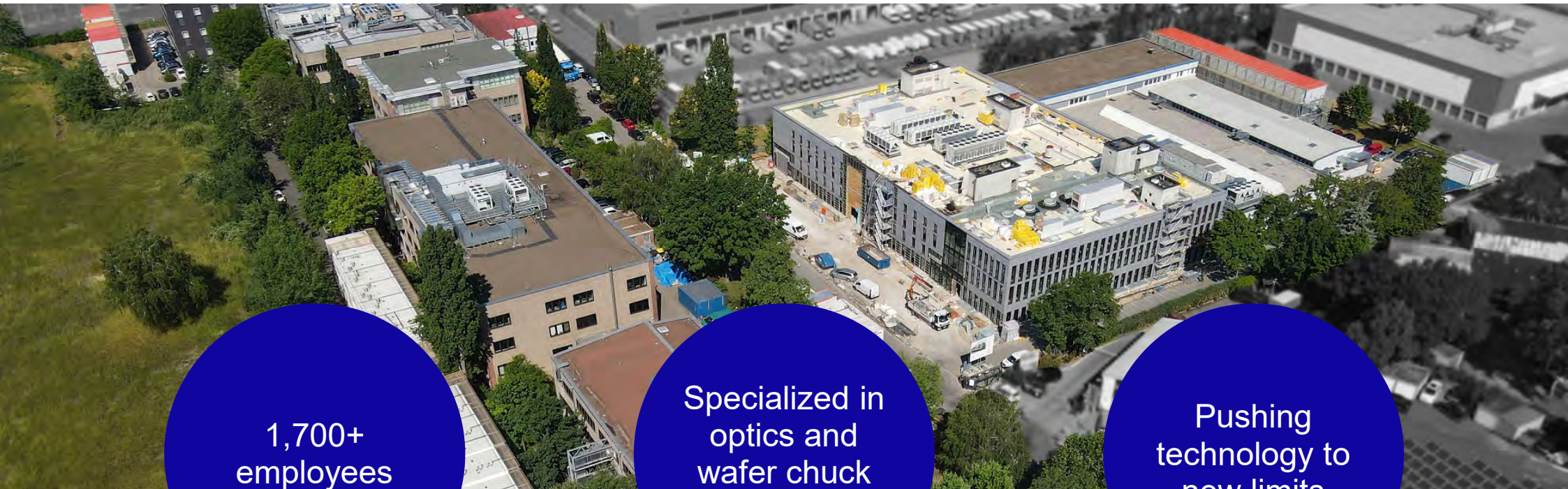
All major chipmakers are our customers

Customer	HQ	2023 capex est. (\$B)
TSMC	Taiwan	33
Samsung	Korea	26
Intel Corporation	USA	23
SK Hynix	Korea	7
Micron	USA	6
SMIC	China	6
GlobalFoundries	USA	3.7
STMicroelectronics	Europe	2.8
UMC	Taiwan	2.5
Texas Instruments	USA	2
Others		25,2
Total <small>(Gartner, Dec 2022)</small>		137.2

ASML in Berlin

A major ASML R&D and manufacturing site

At the moment exclusively in Britz -> next year also in Oberschöneeweide!

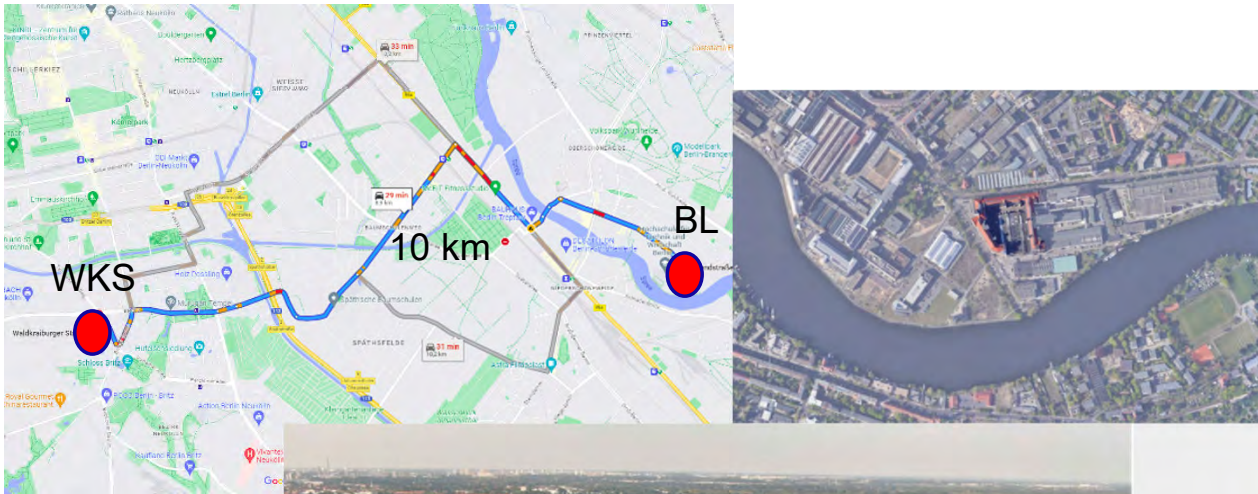


1,700+
employees

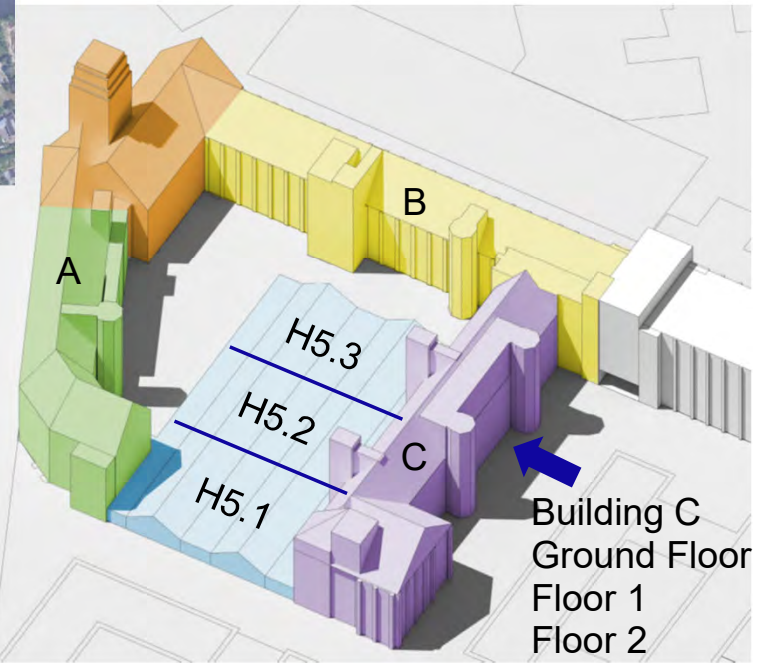
Specialized in
optics and
wafer chuck
technology

Pushing
technology to
new limits

ASML Berlin Bridge Location



Facilities „Behrensbau“ at City District Oberschöneeweide



Largest ASML site in Germany

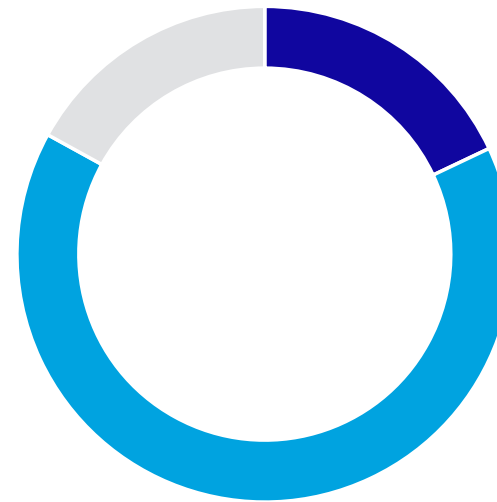
1,700+ employees

Functional expertise



Design and manufacturing of critical high-precision components made of glass and ceramics

Several key components for the ASML lithography systems are developed and produced here, including wafer tables and clamps, reticle chucks and mirror blocks



- 18 % R&D
- 65 % Manufacturing
- 17 % Support