

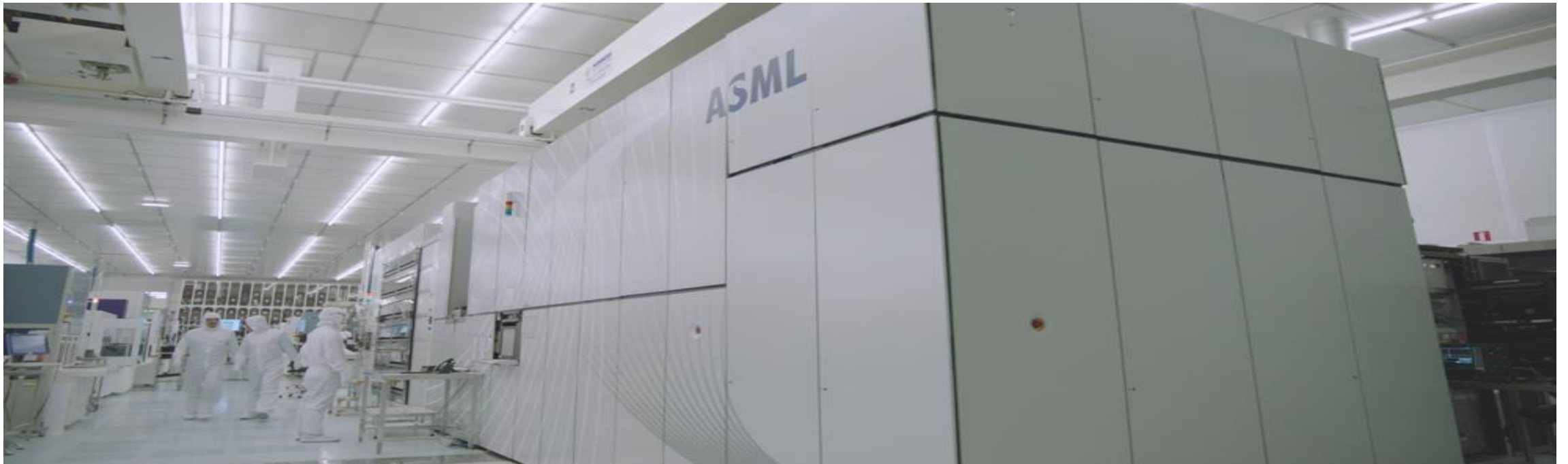
## Innovation at ASML

Païam Dianati

9<sup>th</sup> of April 2024

# Agenda Presentation

- What does ASML do
- Innovation at ASML
- My observations



# In our world today, chips are everywhere!



# Innovation and perseverance have brought us here

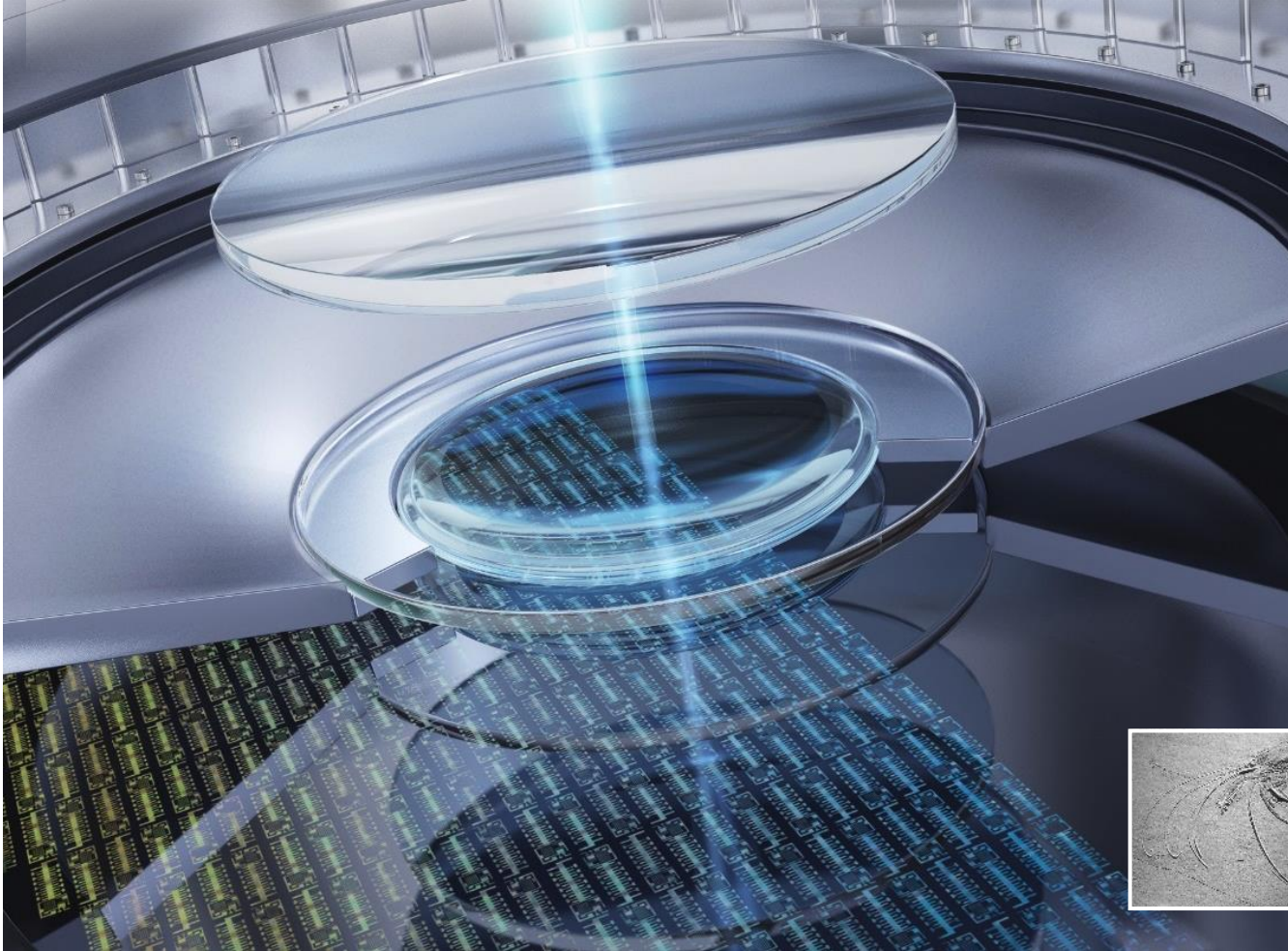


All major  
chipmakers  
use ASML's  
technology

Europe's  
biggest tech  
company by  
market cap

Annual R&D  
budget of  
€2.2bn

# Lithography is critical for shrinking transistors

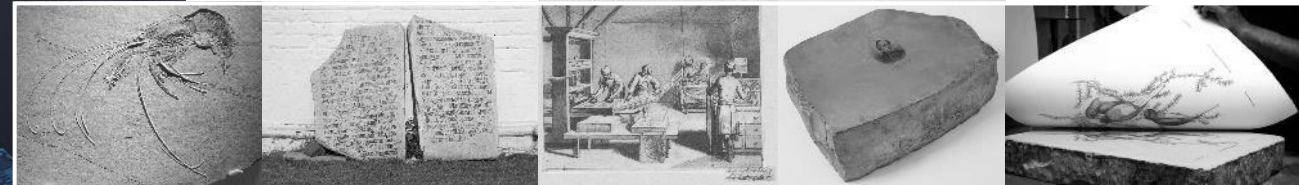


Transistor is an important building block for the creation of electric circuits. It acts as a switch or amplifier for electric signals

Jos Benschop: Sr. VP Technology:

<https://www.youtube.com/watch?v=-8ExdcPtyQ4>

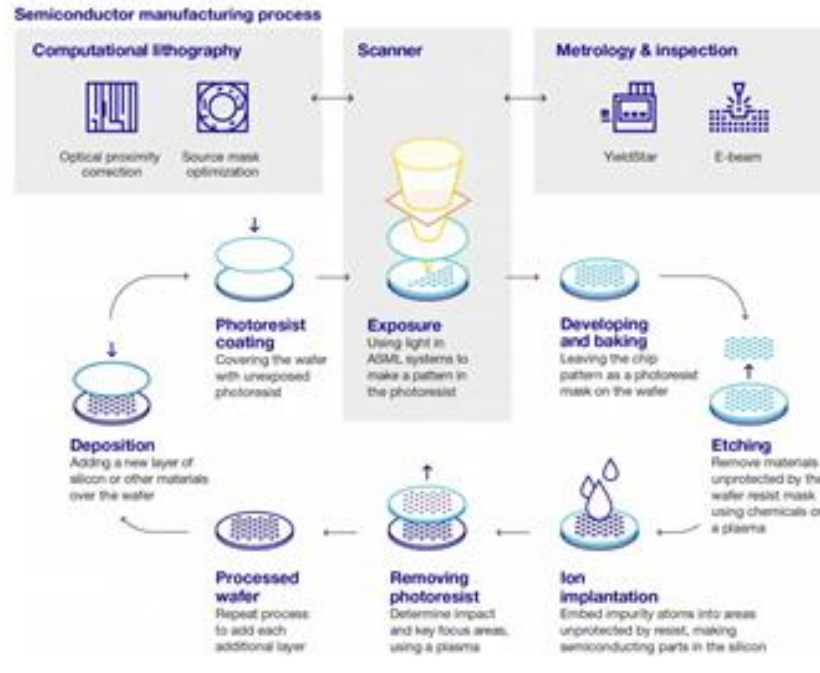
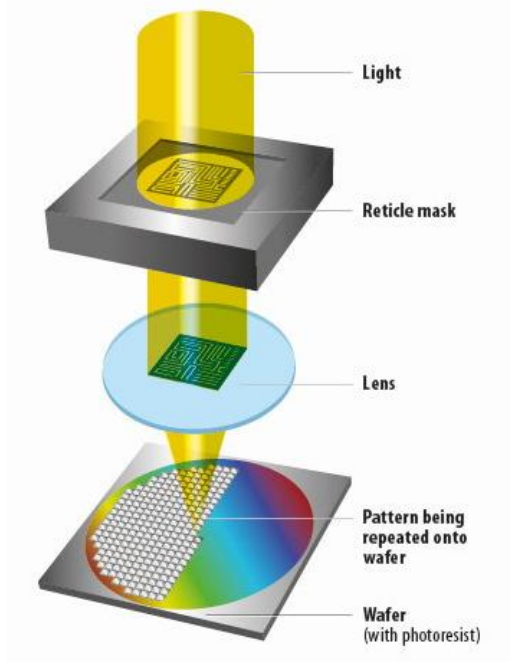
**Lithography:** Ancient Greek λίθος, lithos, meaning 'stone', and γράφειν, graphein, meaning 'to write')



# Lithography is critical for shrinking transistors

Patterns are transferred on a semiconductor wafer

These patterns define the structure of the transistor and other components



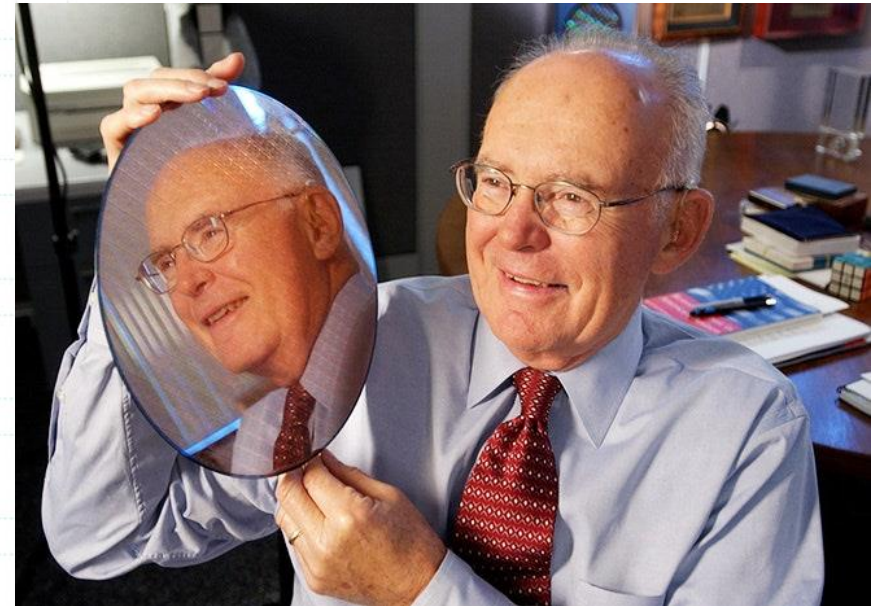
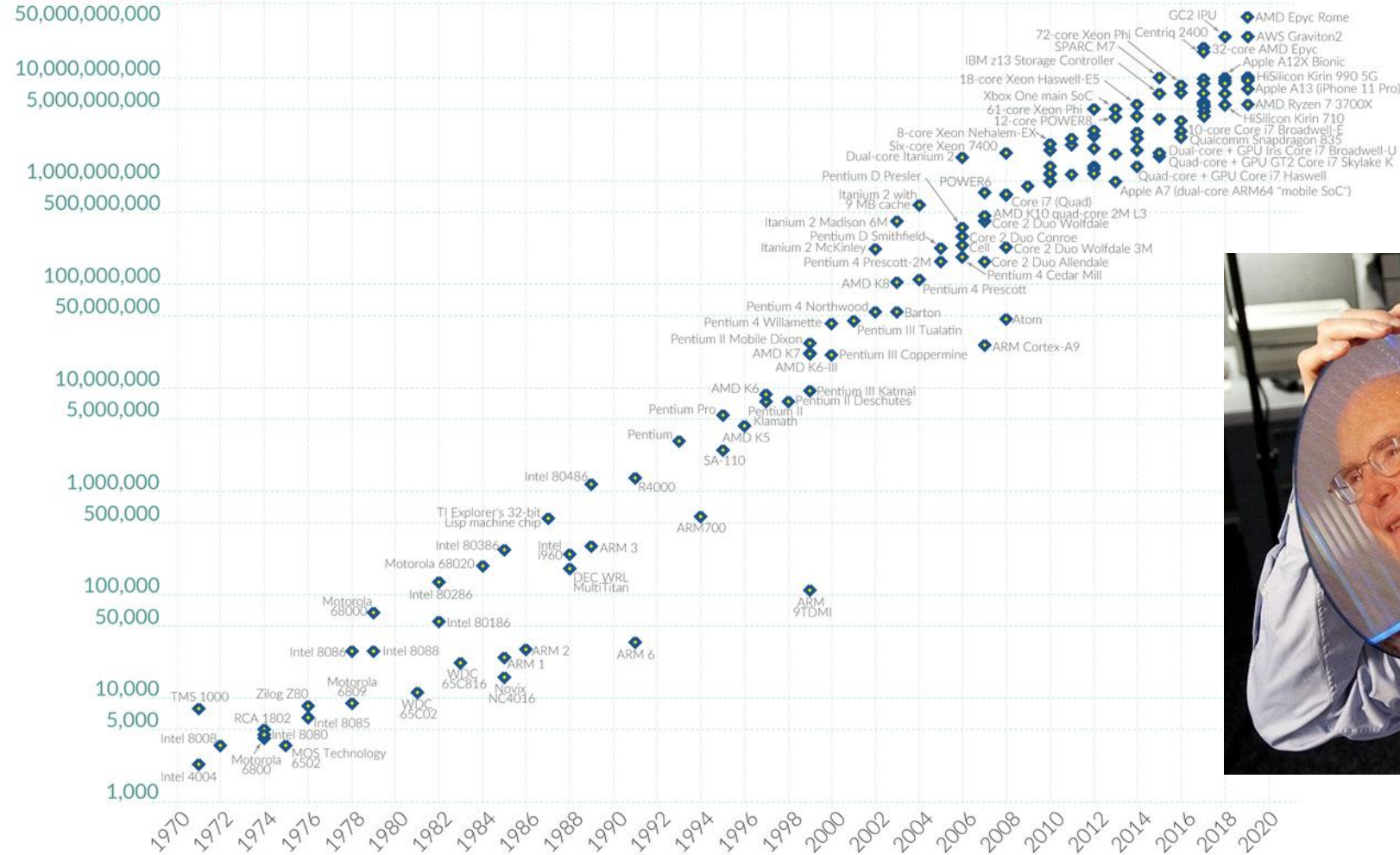
# Moore's Law (1965)

Moore's Law: The number of transistors on microchips doubles every two years



Moore's law describes the empirical regularity that the number of transistors on integrated circuits doubles approximately every two years. This advancement is important for other aspects of technological progress in computing – such as processing speed or the price of computers.

## Transistor count



Data source: Wikipedia ([wikipedia.org/wiki/Transistor\\_count](https://wikipedia.org/wiki/Transistor_count))

Year in which the microchip was first introduced



OurWorldinData.org – Research and data to make progress against the world's largest problems.

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# While transistors are shrinking, our product family and volume is expanding

$$\text{Half-Pitch CD} = k_1 \left( \frac{\lambda}{\text{NA}} \right)$$

- CD:** Critical dimension
- K1:** Process coefficient
- $\lambda$ : Wavelength of light
- NA:** Numerical aperture of lens



**1980s:**  
PAS 2000/5000



**1990s:**  
PAS 5500



**2000s:**  
TWINSCAN  
DUV



**2010s:**  
EUV

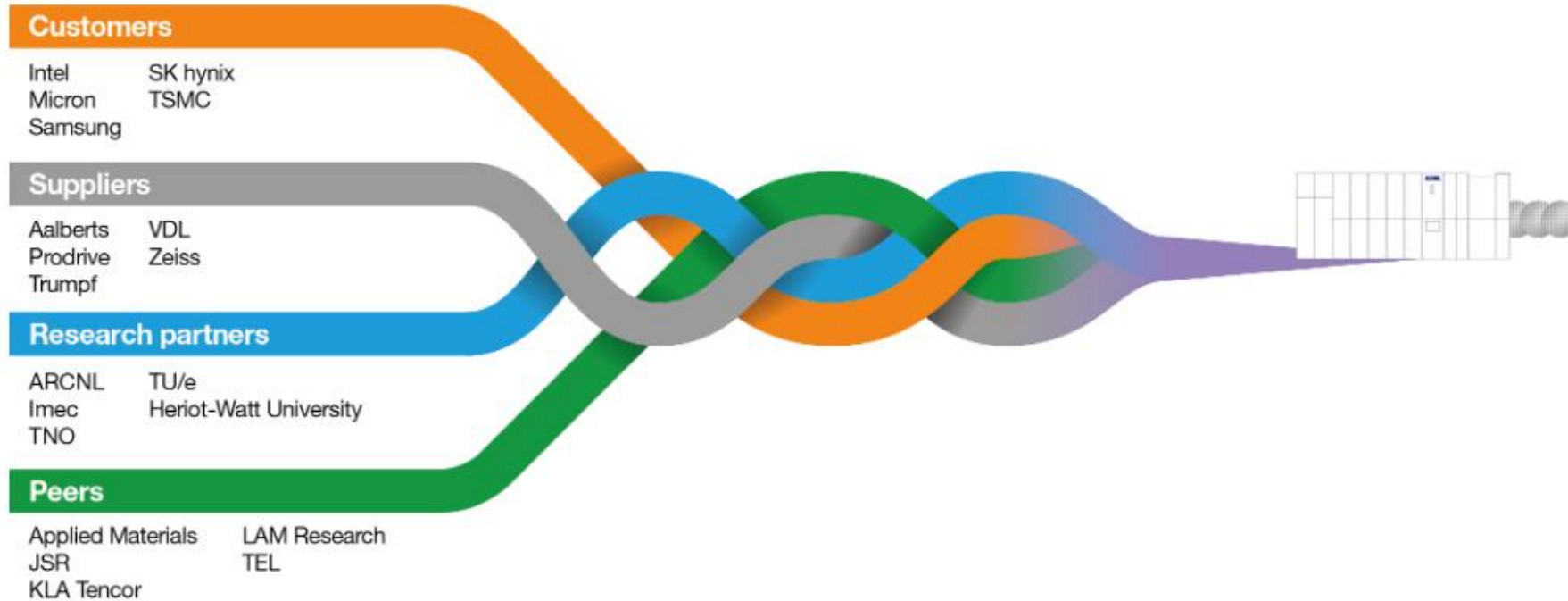


**2020s:**  
High-NA EUV



# What makes ASML unique as high tech innovative company

## My personal observations



# Customer intimacy

- 2012: Customer Co-Investment Program: Aimed at accelerating Innovation
- Participating customers invest in equity and R&D
- Intel invested 4.1 billion ASML in 2012 and has 15% of ASML shares
- Samsung is 1.5% owner of ASML
- CS at customer site, local warehouses and local repair centers



TECH DRIVERS

## Samsung and ASML to invest \$760 million to build an advanced chip plant in South Korea

PUBLISHED WED, DEC 13 2023·12:47 AM EST | UPDATED WED, DEC 13 2023·10:19 AM EST

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### KEY POINTS

- ASML and Samsung Electronics agreed to jointly invest 1 trillion won to build a plant in South Korea to develop high-tech semiconductor processing technology for cutting-edge chips.

# Close collaboration with Partners

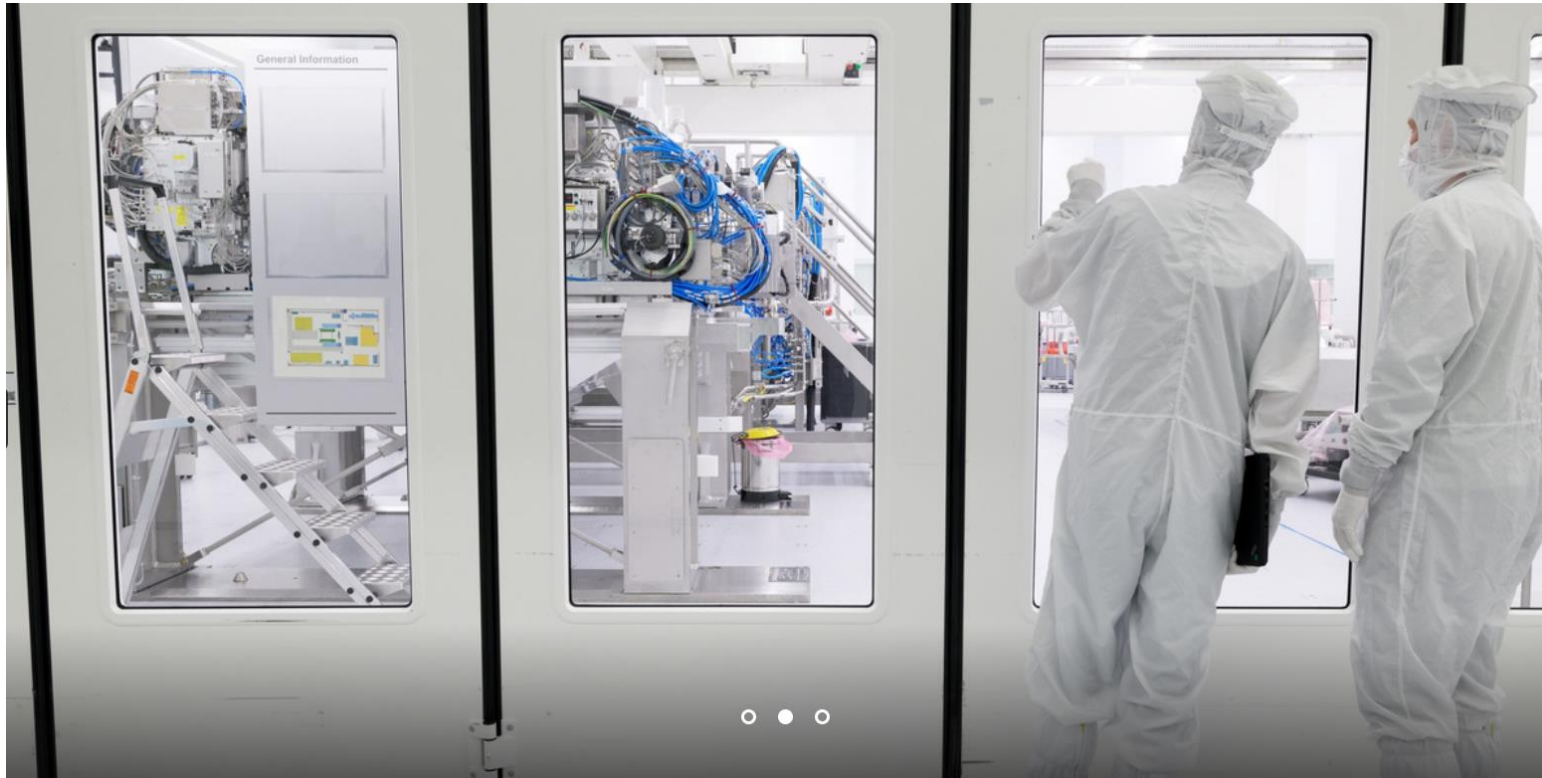
- Early involvement in roadmap and design
- Supplier such as Zeiss involved in the project 2 years before start of development
- Prototypes from Supplier are tested / used at ASML
- Application for communicating at part level
- Sharing of tooling equipment

Zeiss Optical System EUV






# Relentless investment in innovation

- Constant investing in R&D
- 2009 Difficult year for ASML



# My observations

- Project: Scrap prevention in return part quality 4 days
- Thesis: Value creation by upcycling, what are the drivers and barriers 1 day
- Mandatory training and waiting for approvals
- Onboarding
- Team: 4 persons
- Project meetings

 <p><b>We challenge</b></p> <p>Say it can't be done, we dare you. We eagerly refine our ideas and processes, pushing technology and results to new limits.</p>	 <p><b>We collaborate</b></p> <p>We collaborate to tap into our collective potential. We work together with our stakeholders to create the best solutions for...</p>	 <p><b>We care</b></p> <p>We act with integrity, respecting people, society and the planet. We take responsibility to create a safe, inclusive and trusting...</p>
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**Q & A**

# ASML

