



Unlocking the next wave of accelerated innovation by AI

ASML as a part of the AI ecosystem

Wei Li
SVP D&E Software

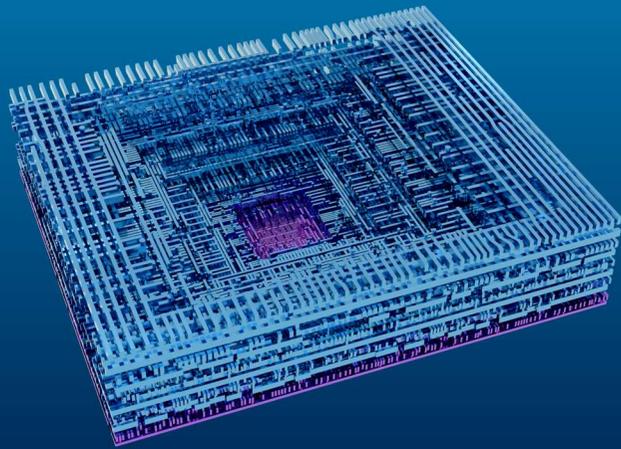
ESI symposium 2025



ASML plays a dual role in the AI era

The world's future will be AI and we are an integral part of it

ASML fuels the progress of AI chips
with innovations in
extreme performance requirements



ASML incorporates AI
to enhance scanner control and
enable engineers to deal with
large scale complexity

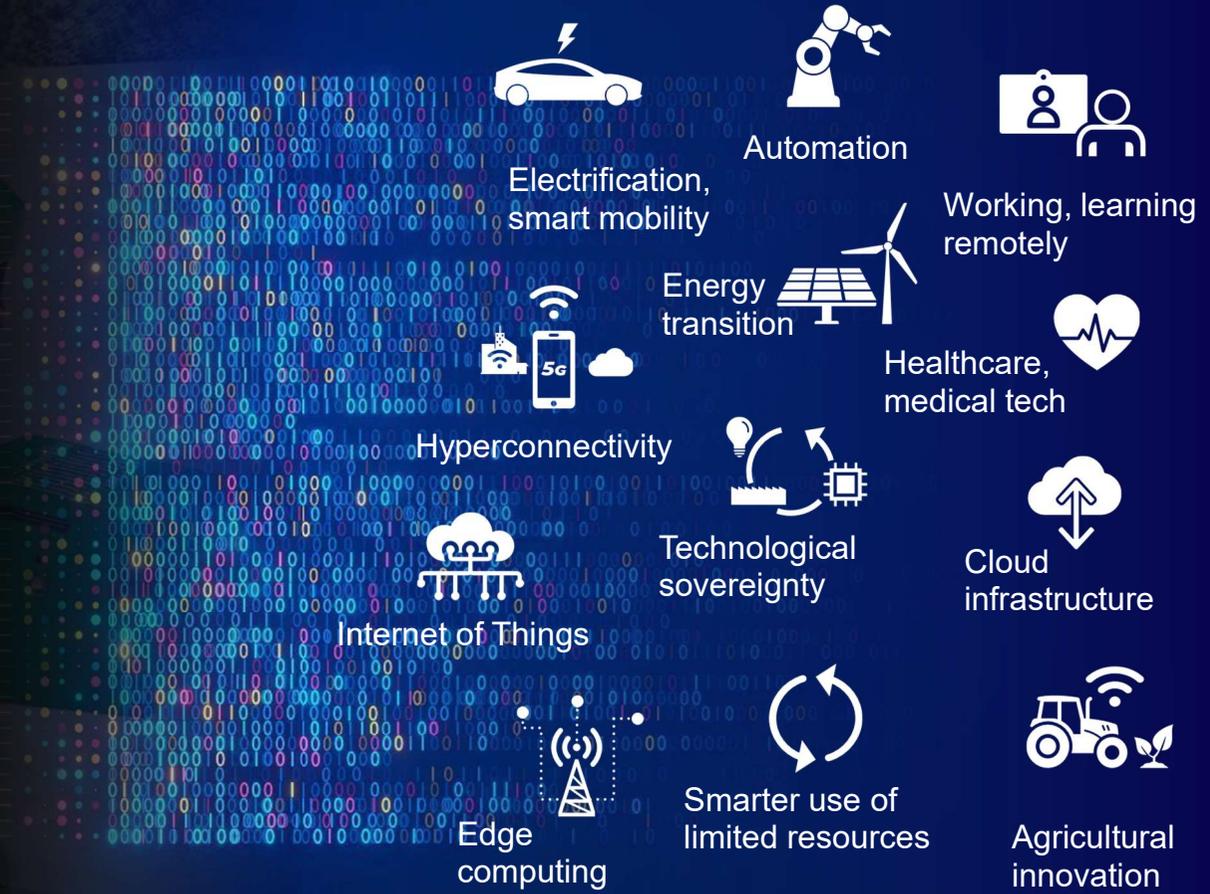


From chips everywhere to AI everywhere

It requires semiconductor strategy to align with the emerging needs of power/memory

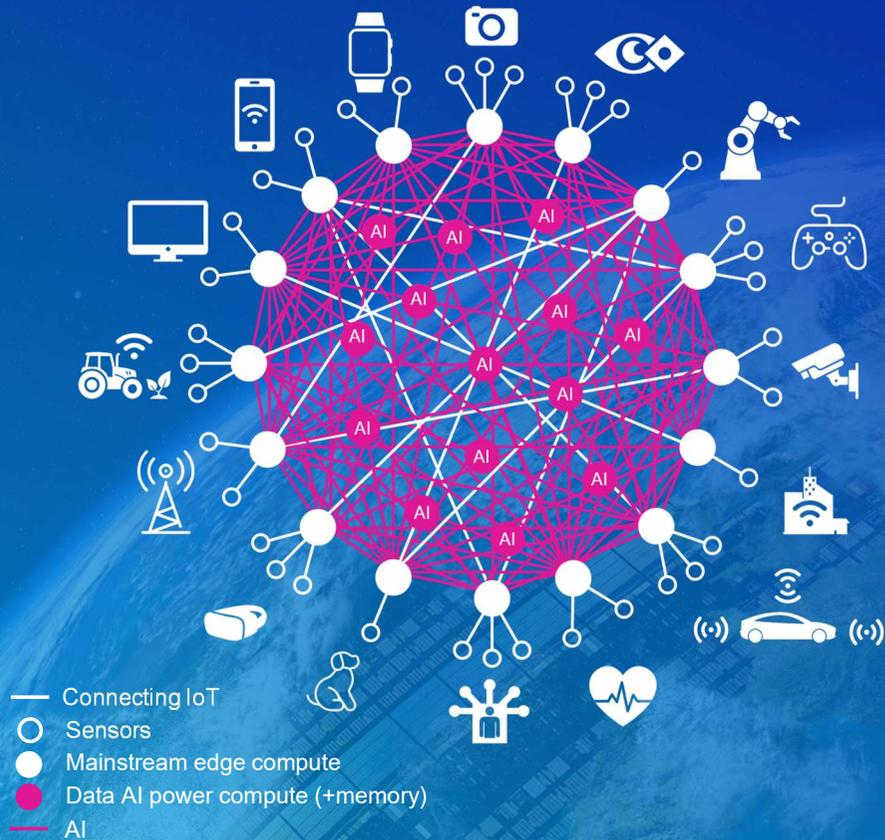


Nvidia project DGX Spark personal AI supercomputer

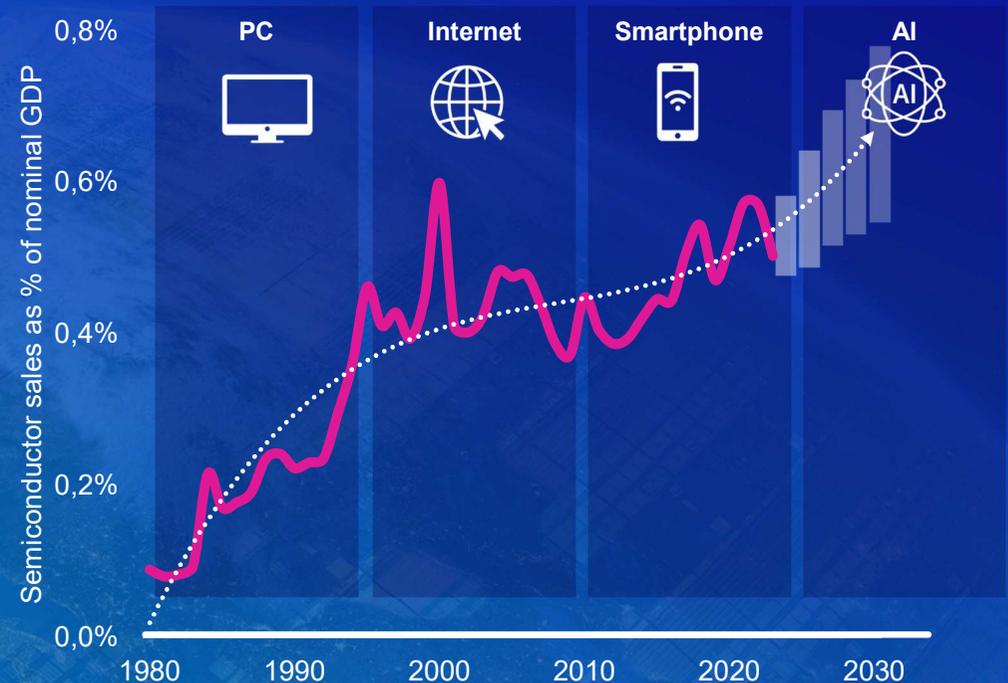


AI has strong potential to drive the entire semiconductor industry forward

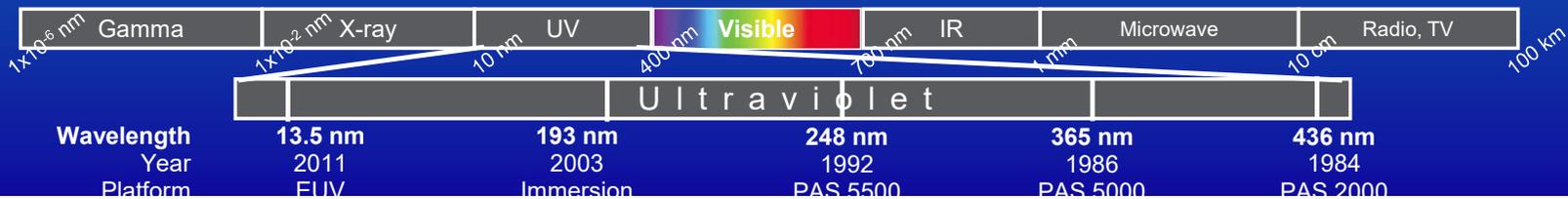
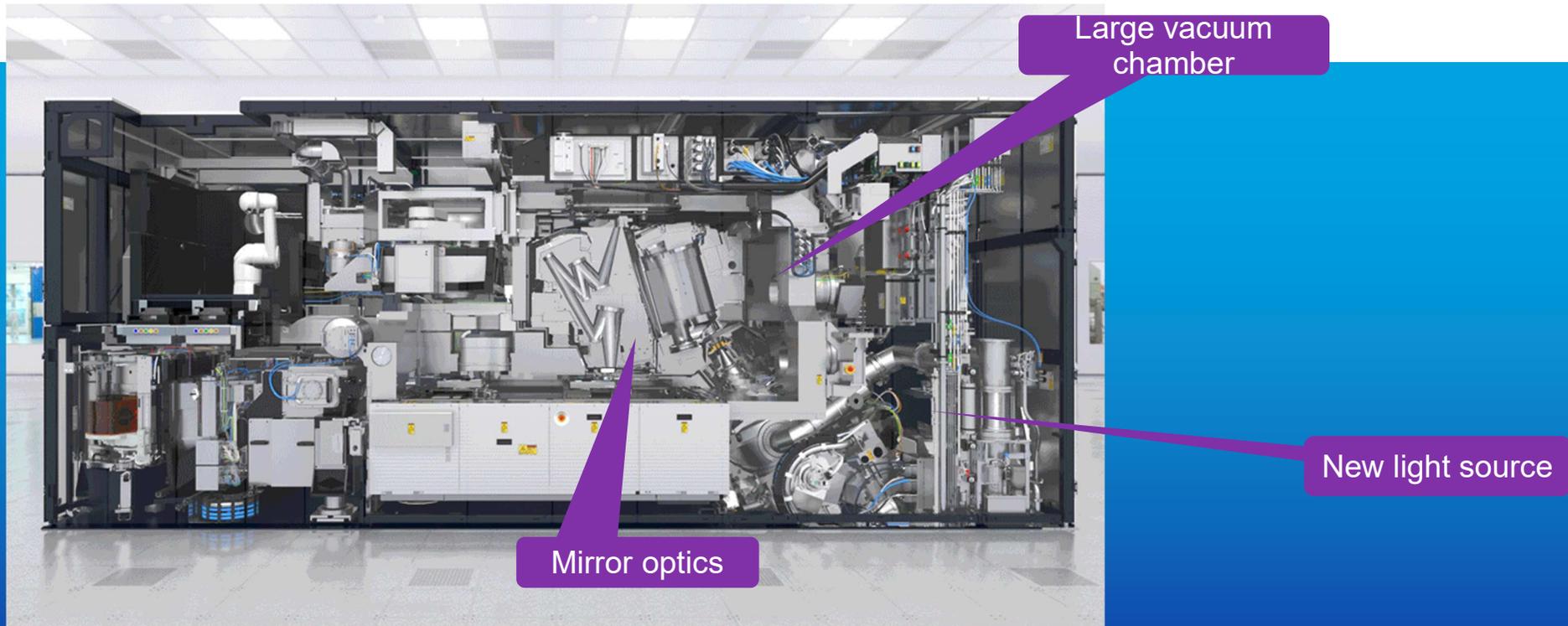
We will see AI penetrate all different segments of the semiconductor eco-system



Semiconductor sales as % of global nominal GDP have steadily grown across the previous computing waves



ASML lithography system is a key equipment to produce AI chips



Lithography innovation keeps chip manufacturing affordable



PAS 2500/10
Res: 900nm
W: 150mm
Wph: 66

80s

436 nm → 365 nm light
100 mm → 150 mm wafers



PAS 5500/60
Res: 450nm
W: 200mm
Wph: 48

90s

248 nm → 193 nm light
150 mm → 200 mm wafers
'step & repeat' → 'step & scan'



TWINSCAN AT:850
Res: 110nm
W: 300mm
Wph: 102



TWINSCAN XT:1400
Res: 65nm
W: 300mm
Wph: 145

00s

200 mm → 300 mm wafers
Dry → immersion lithography
Single stage → dual stage



TWINSCAN NXT:1950i
Res: 38nm
W: 300mm
Wph: 190



TWINSCAN NXE:3400B
Res: 13nm
W: 300mm
Wph: 125

10s/20s

Litho → Holistic litho
Immersion → EUV
EUV 0.33 → EUV 0.55



High NA EUV
Res: <8nm
W: 300mm
Wph: 185

Moore's law: number of transistors per chip doubles per 2 years, while the cost of computing is halved.

Relative cost
per pixel

Technology-wise, we had to move mountains

$$CD = \frac{k_1 \cdot \lambda}{NA}$$

80s

436 nm → 365 nm light
100 mm → 150 mm wafers



PAS 2500/10
Res: 900nm
W: 150mm
Wph: 66

90s

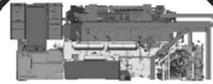
248 nm → 193 nm light
150 mm → 200 mm wafers
'step & repeat' → 'step & scan'



PAS 5500/60
Res: 450nm
W: 200mm
Wph: 48

10s/20s

Litho → Holistic litho
Immersion → EUV
EUV 0.33 → EUV 0.55



High NA EUV
Res: <8nm
W: 300mm
Wph: 185

00s

200 mm → 300 mm wafers
Dry → immersion lithography
Single stage → dual stage



TWINSCAN NXE:3400B
Res: 13nm
W: 300mm
Wph: 125



TWINSCAN NXT:1950i
Res: 38nm
W: 300mm
Wph: 190



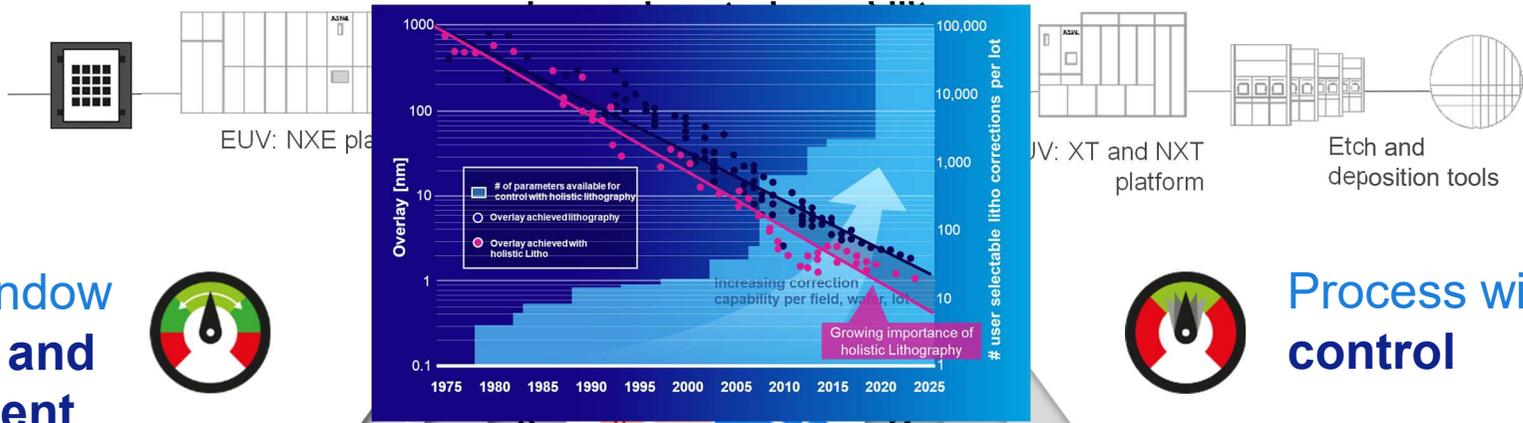
TWINSCAN XT:1400
Res: 65nm
W: 300mm
Wph: 145

System complexity

Scanner control is inherently a holistic task and can benefit from AI

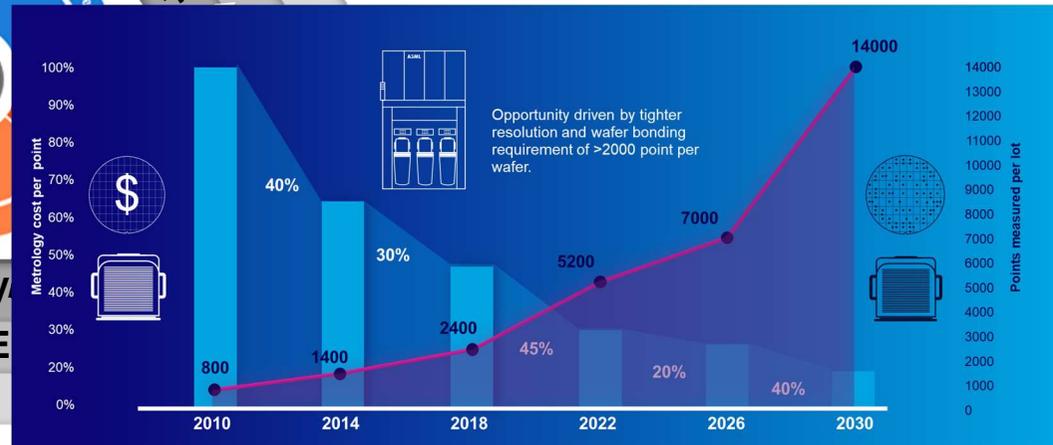
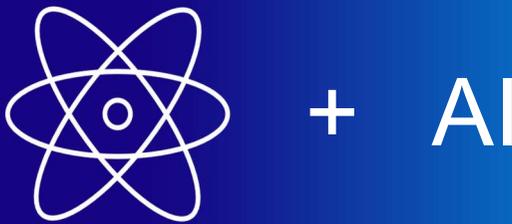
Driven by steep increase in number of actuators, amount of data, and complexity of models

Lithography scanner with



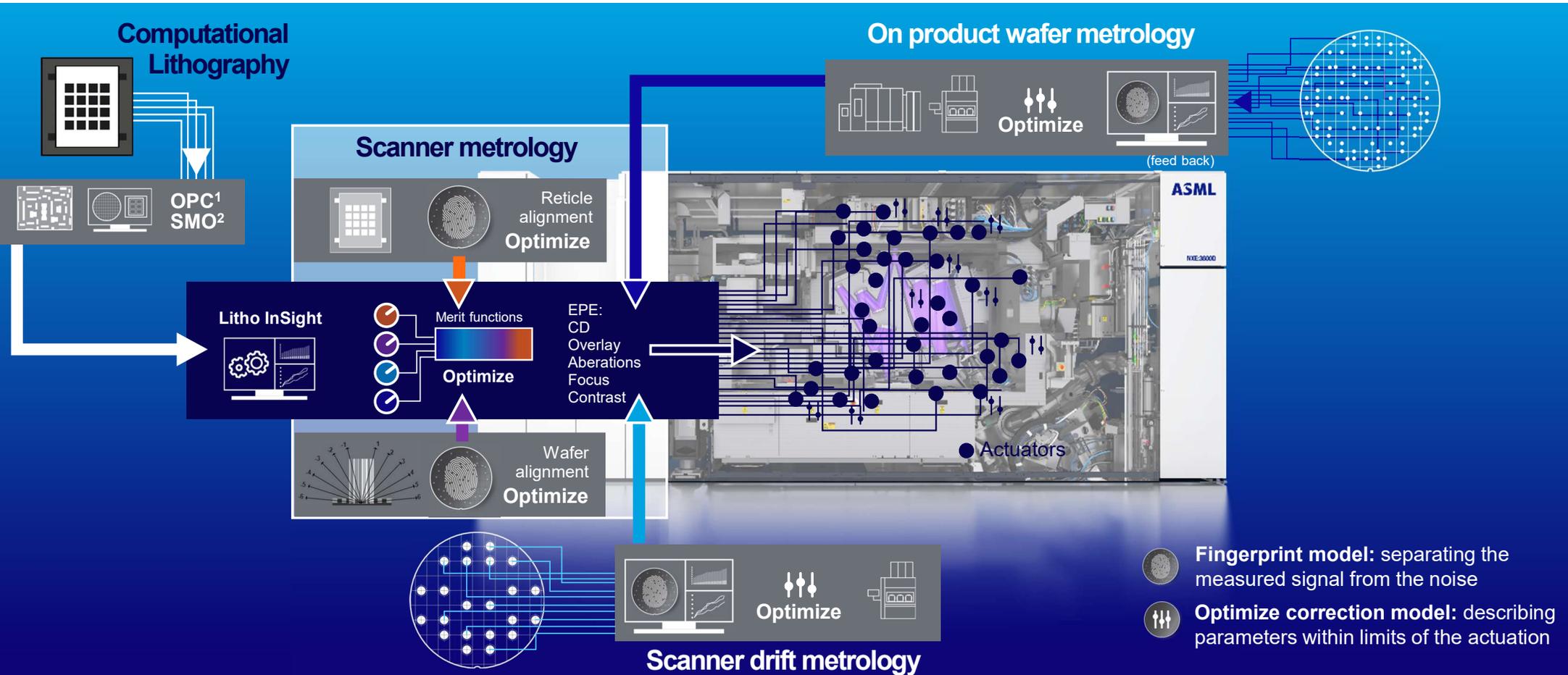
Process window prediction and enhancement

Process window control



Process window detection

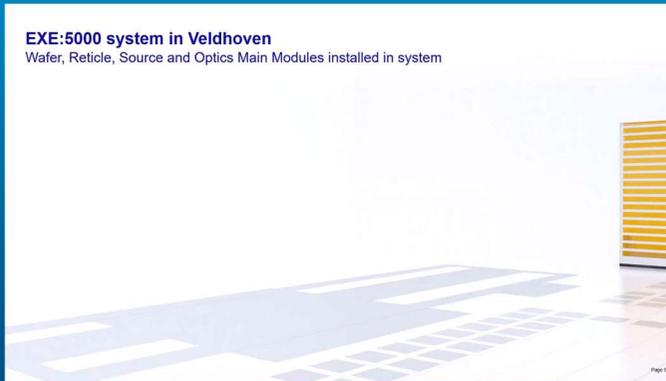
AI applied to scanner control can help optimize most effectively the fast-growing number of actuators, parameters, and mass metrology data



From design to manufacturing: multiple level large scale complexity

Modular system design

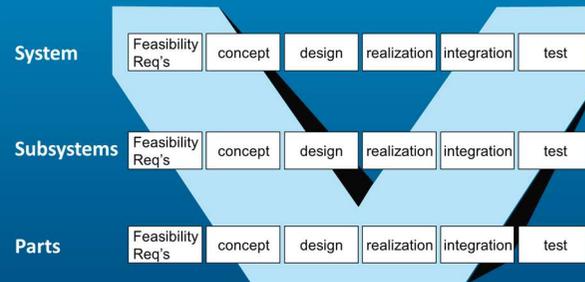
integration of physics, hardware, software



7 product platforms

Concurrent engineering

V-model



>250,000 unique parts

System integrator



~90,000 work instructions
~15,000 D&E engineers

AI potential: from design contribution to customer value

First results available, many more feasibility studies to start across holistic litho triangle



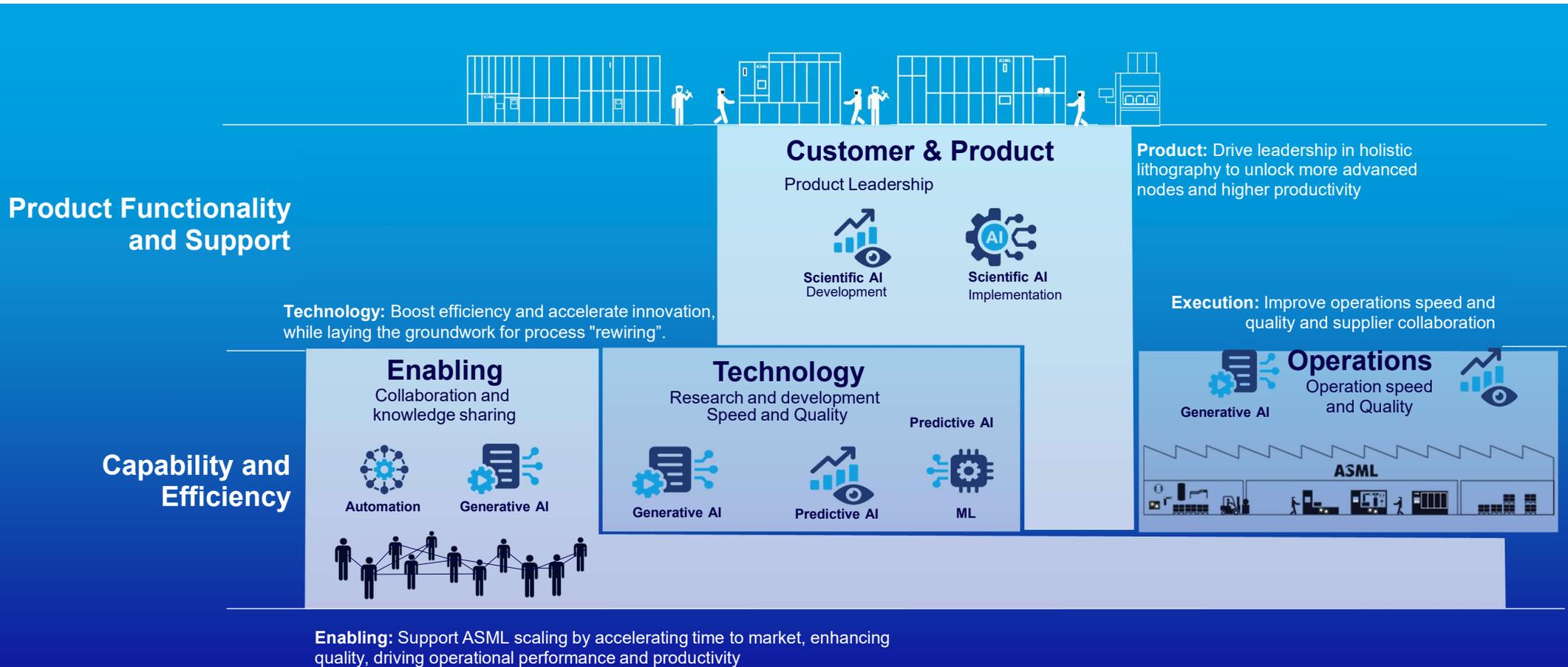
Holistic Lithography



Module design optimization	System integration	Setup and inspection sampling plan	Wafer and layout processing	Utilization
<p>Faster delivery of hardware design and software code with assistant of AI</p>	<p>Improve quality of problem resolution & procedures</p>	<p>Improve source power stability and output with AI assisted optimization</p>	<p>Improve OVL with better process window controls and defect detection rates</p>	<p>Improve quality of problem resolution & procedures</p>

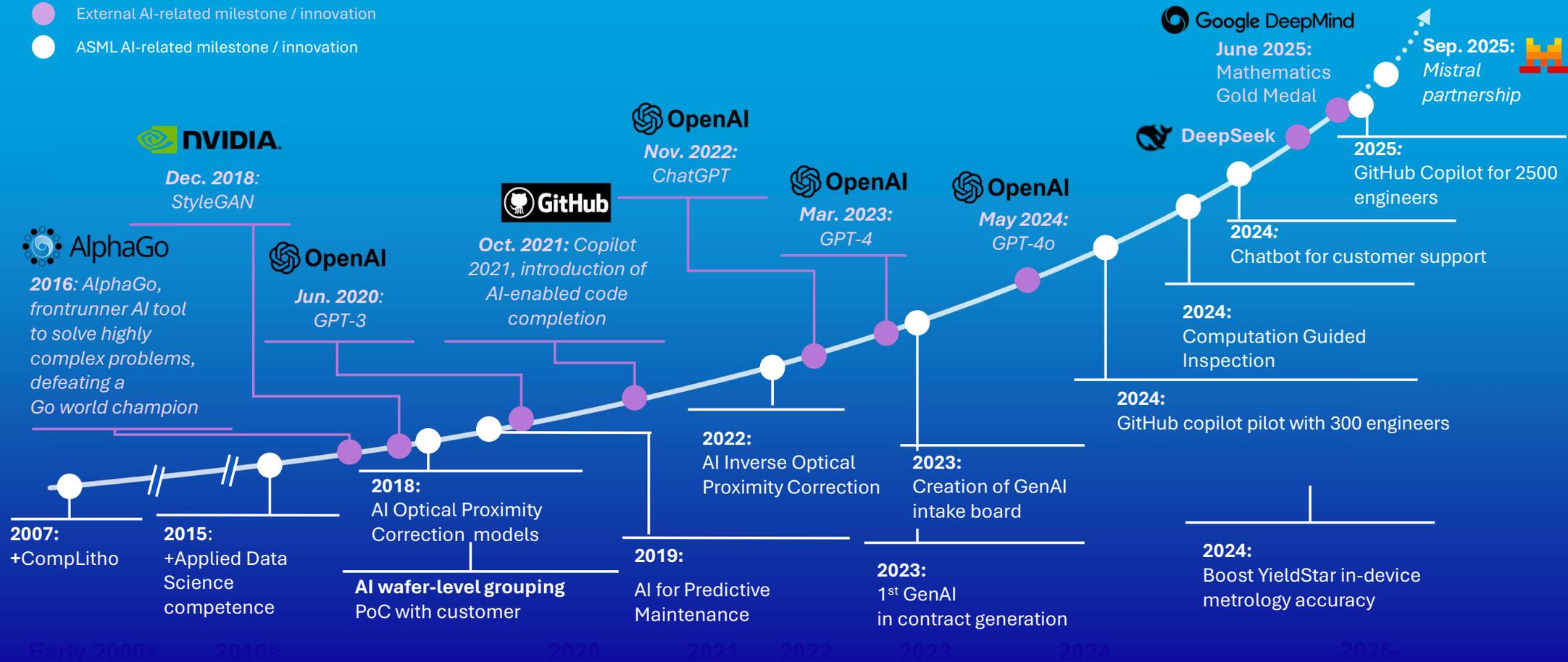
AI is a key to accelerate innovation and tackle complexity in development

AI strategy and roadmap in place for all key domains of ASML



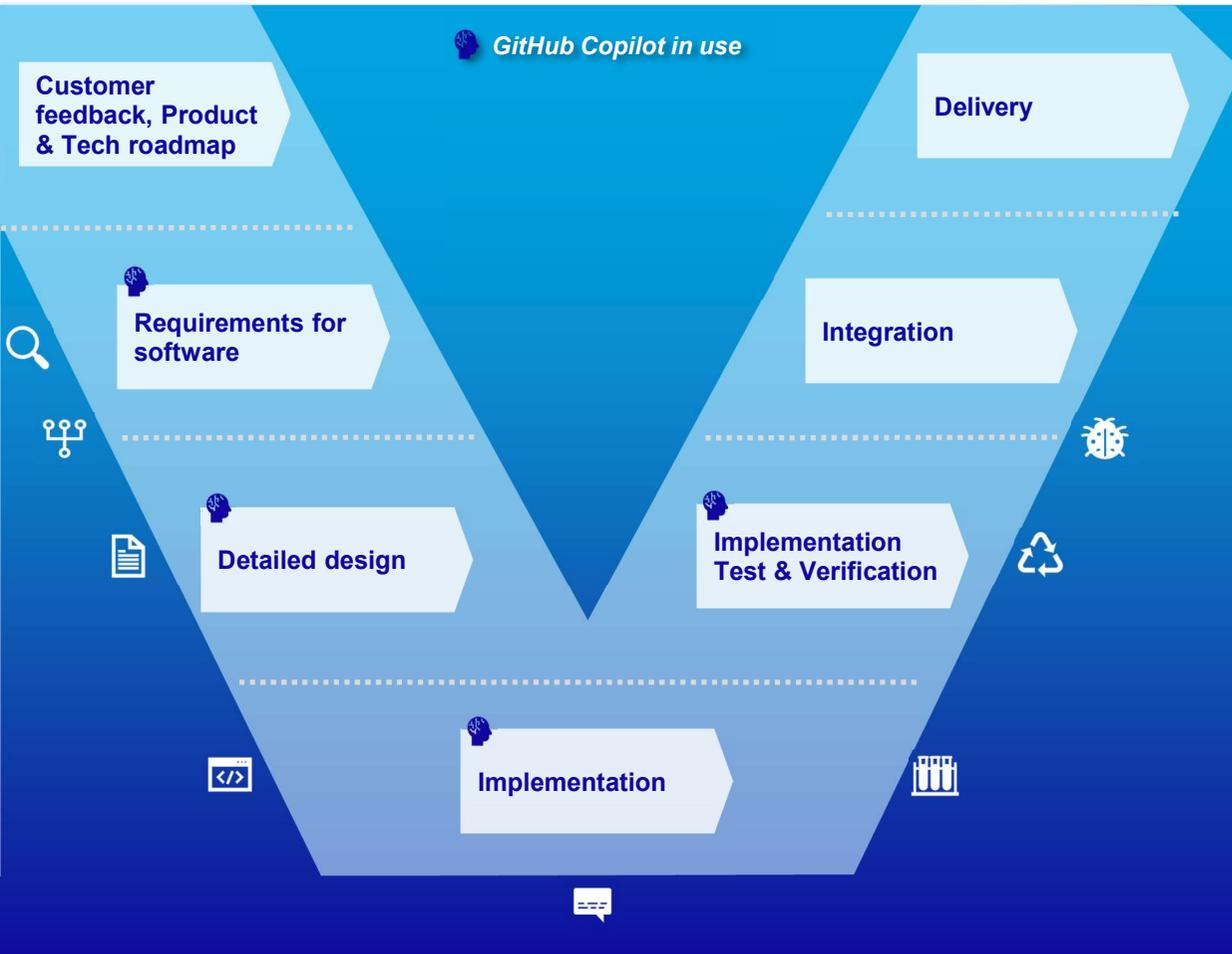
AI is not new to ASML: Responding to industry trends, we have taken great steps towards AI enablement

- External AI-related milestone / innovation
- ASML AI-related milestone / innovation



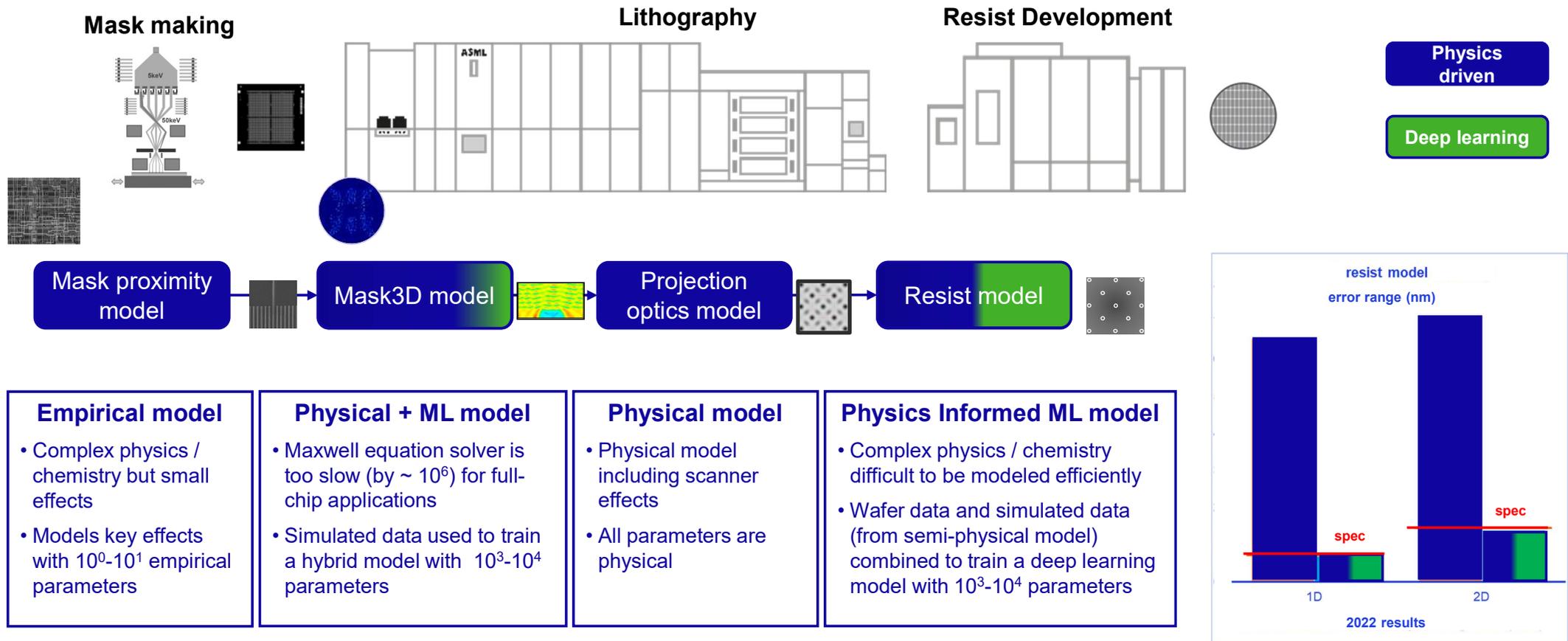
Show case 1: GitHub Copilot integrated in entire Software Value Stream

To improve code development efficiency and quality



GitHub Copilot use cases		
	Learn & Explore	Quickly understand unfamiliar code or libraries by generating explanations or summaries based on queries
	Diagram Generation	Create a UML* class diagram, including all dependencies to visualize code structure and relationships
	Document Generation	Generate descriptive comments or summaries for code: functions, classes, and modules based on ASML context
	Code generation	Generate inline suggestions which can be accepted by the designer
	Code translation	Cross-language code translation, to migrate algorithms or utilities between different programming environments
	Code quality validation	Refactor existing code, suggesting improvements and best practices even for languages like MATLAB
	Test creation	Automatically generate unit tests and identify gaps in test coverage by analyzing test files
	Error log debugging	Assist in debugging verbose error logs for resolving issues

Show case 2: Computational lithography model incorporates physics knowledge and deep learning technology to achieve superior accuracy



Show case 3: Feasibility study shows that GenAI can reduce manual effort for work instructions update

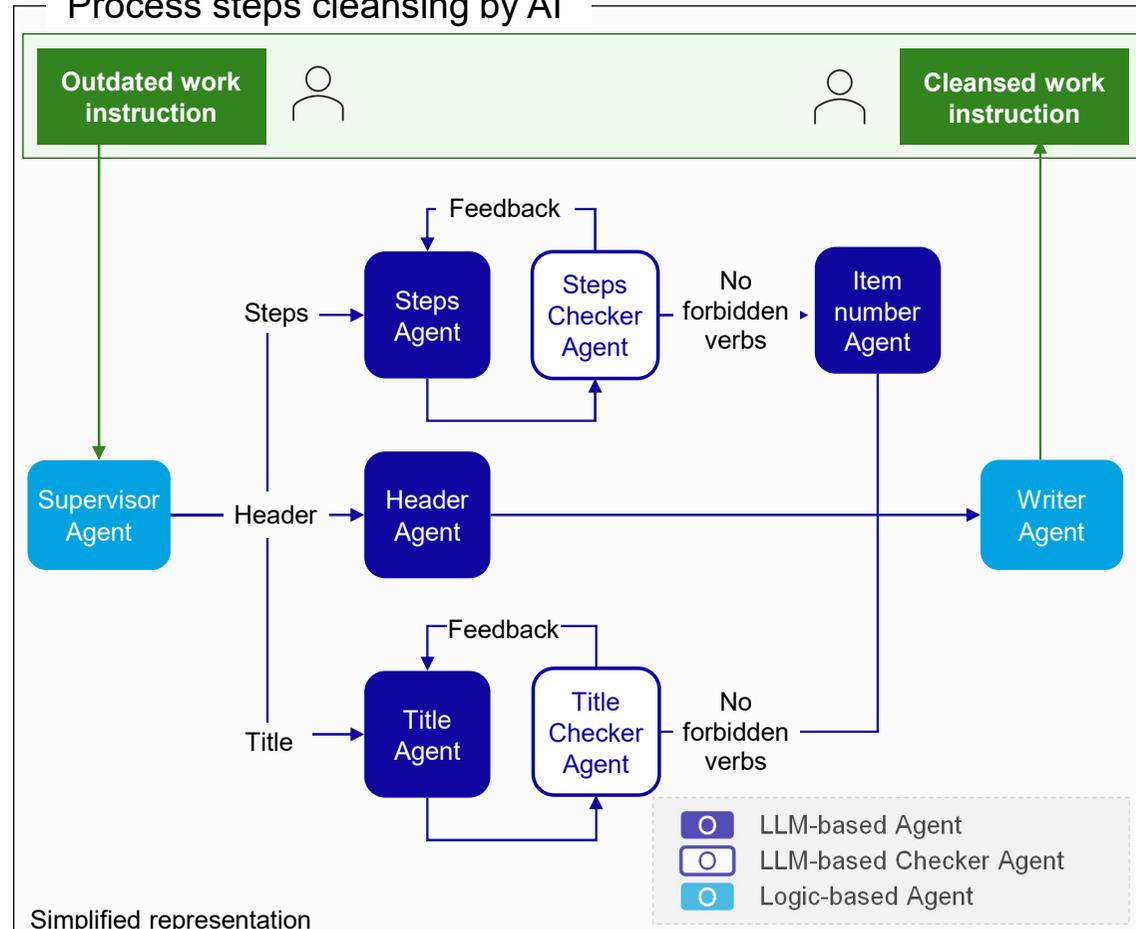
Business context

- 90K+ work instructions, used by 15K+ employees to build, install and service systems for their customers
- work instructions updated 2x per year, to ensure compliance with latest standards on content and structure
- GenAI shows better quality, shorter labor duration with human-in-the-loop



Work pitched by MSFT CEO during GenAI conference in Amsterdam in 2025

Process steps cleansing by AI



Show case 4: Improving customer support capability by leveraging ChatBot in software release documents

Manual review



Challenges:

- Release bulletins require in-depth technical description of new functions and issue resolution for customers
- Lengthy release bulletins need to be generated by iterative manual process and reviews.

AI translates technical description



to customer descriptions for release bulletins, ...

AI-assisted review

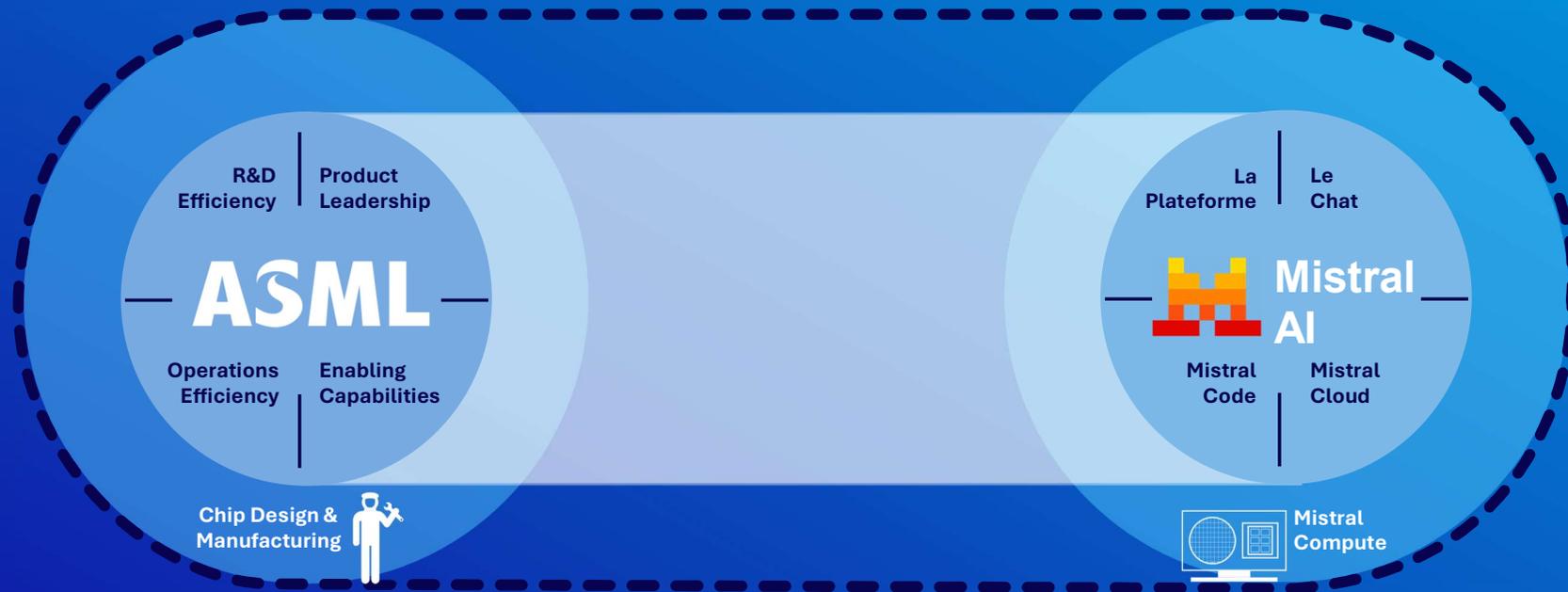


Improvements:

- Experts review and approve AI-generated customer description (“human in the loop”),
- Empowered by ChatBot, it simplifies the tasks to identify specific customer relevant features, improvements, bug fixes, and assess potential risks for upgrade.

ASML does not do this alone

The strategic partnership with Mistral will help us to strengthen our core competence and to support future customer value



ASML

Thank you!