

Role of Holistic Lithography and its Business Opportunity

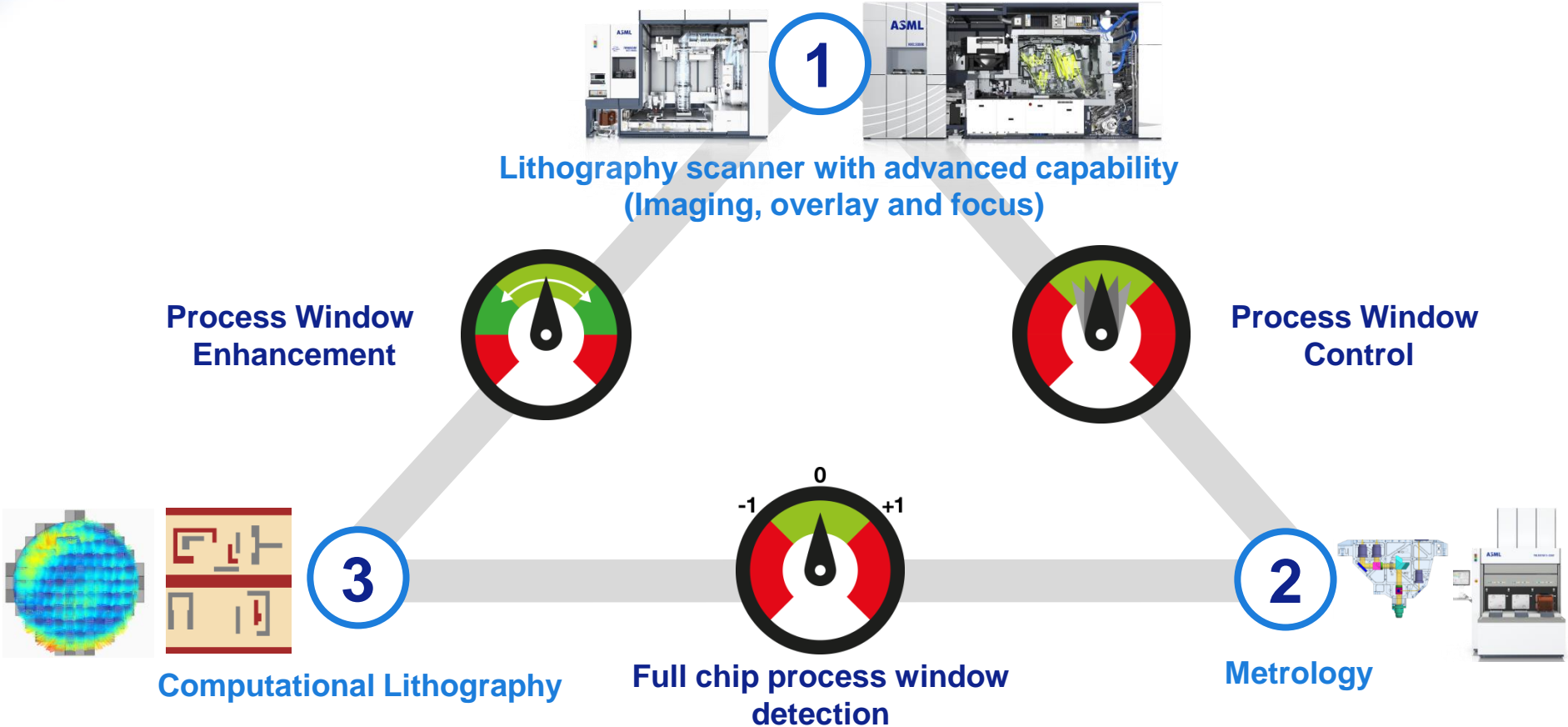
Christophe Fouquet
Executive Vice President, Applications

31 October 2016

Holistic lithography: from a point-to-point approach to an integrated solution to support patterning roadmap

- ASML has delivered proven Holistic Lithography process control solutions to the industry over the last 5 years, involving computational lithography, metrology and scanner control, driving >20% year on year revenue growth
- We have identified new process control opportunities, built on the same unique and proven approach that will continue to provide additional value to our customers
- The largest new opportunity resides in the extension of “image placement” (OVERLAY) control to a comprehensive control of “image quality” (PATTERN FIDELITY)
- The addition of HMI’s portfolio and technology to our existing Holistic Lithography portfolio will extend our control scope leading us to expect a continuation of a >20% year on year growth at very good margins

ASML Holistic Lithography approach seeks to maximize patterning process performance and control

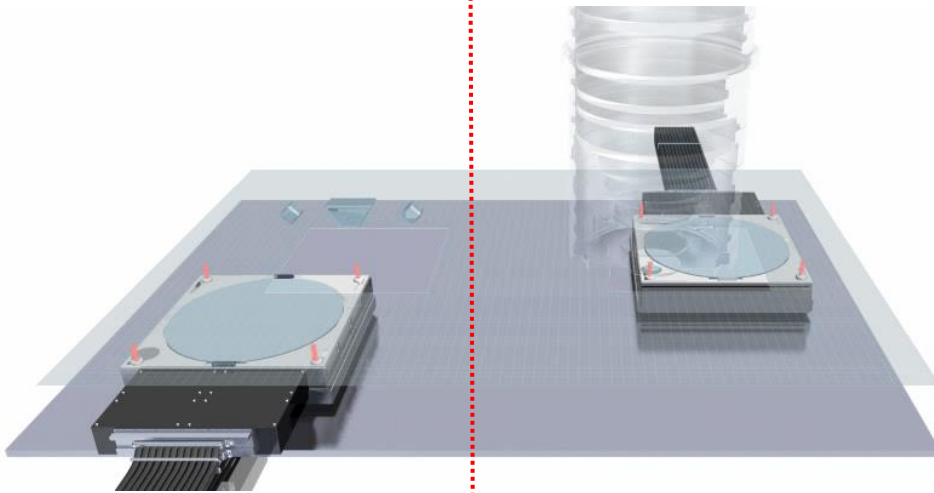


ASML scanners at the core of patterning control capability

ASML scanners measure 100% of the wafers

ASML Scanner
Metrology stage

ASML scanner
Exposure stage



100% of the wafers
are measured

Wafer processed
field by field

Metrology and models are needed to describe process fingerprint

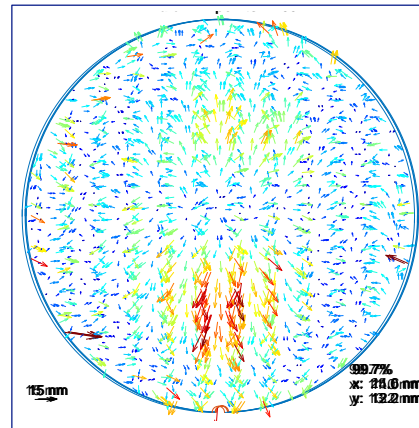
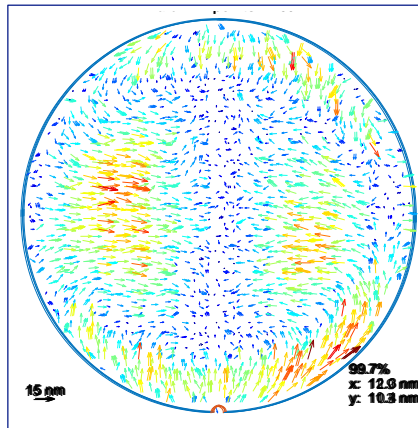
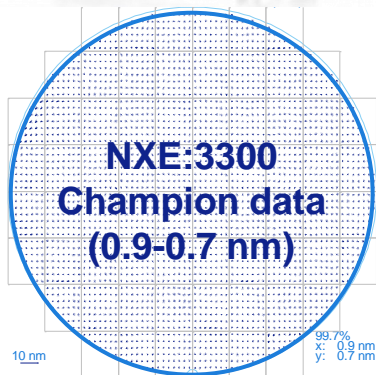
+ Use of computational lithography

Wafer 1

Wafer 2

>1500pts/ wafer

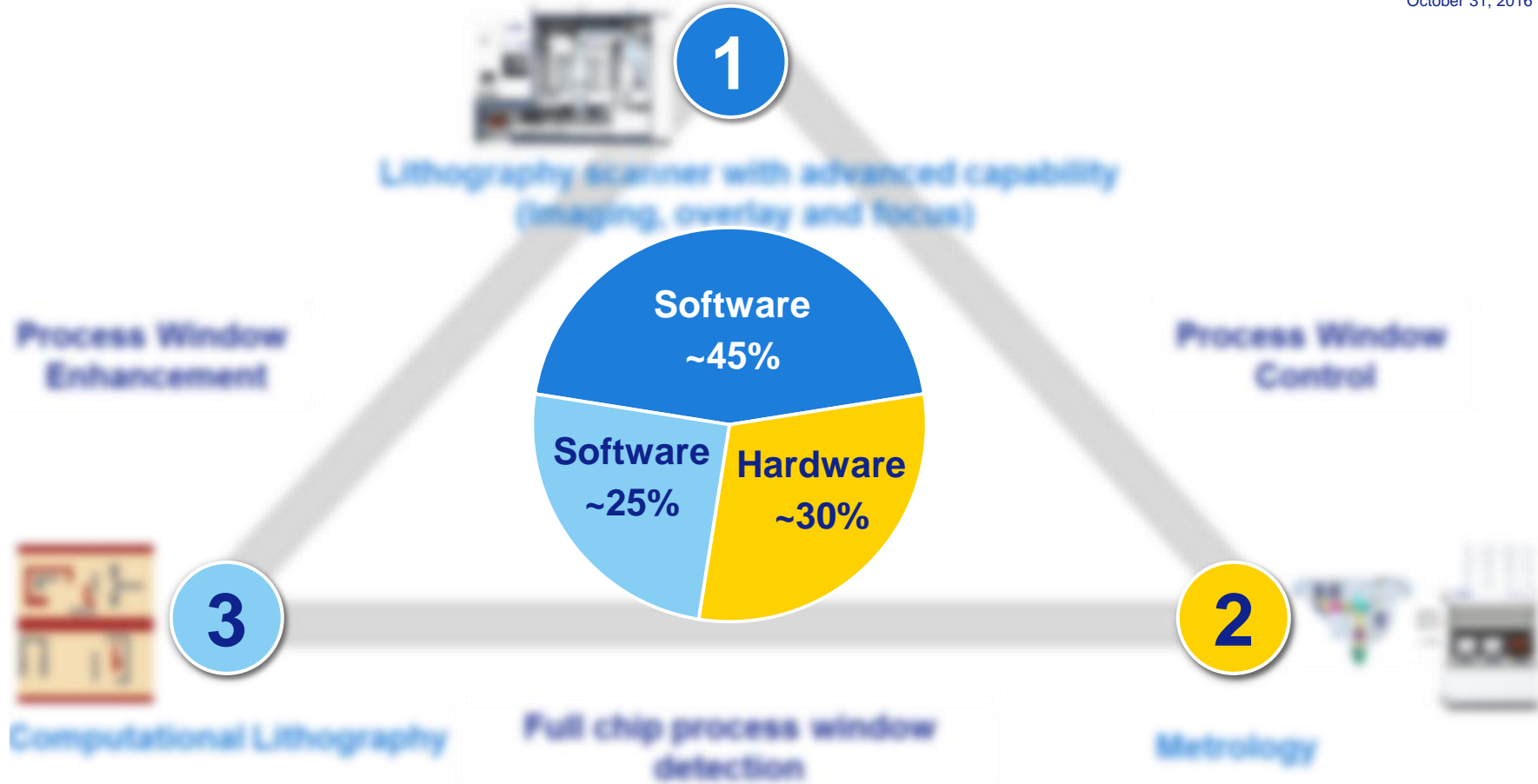
>1500pts/ wafer



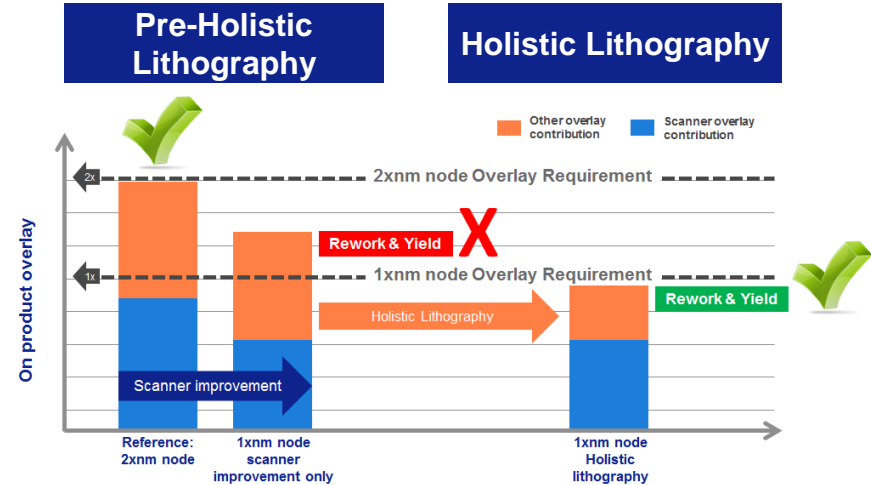
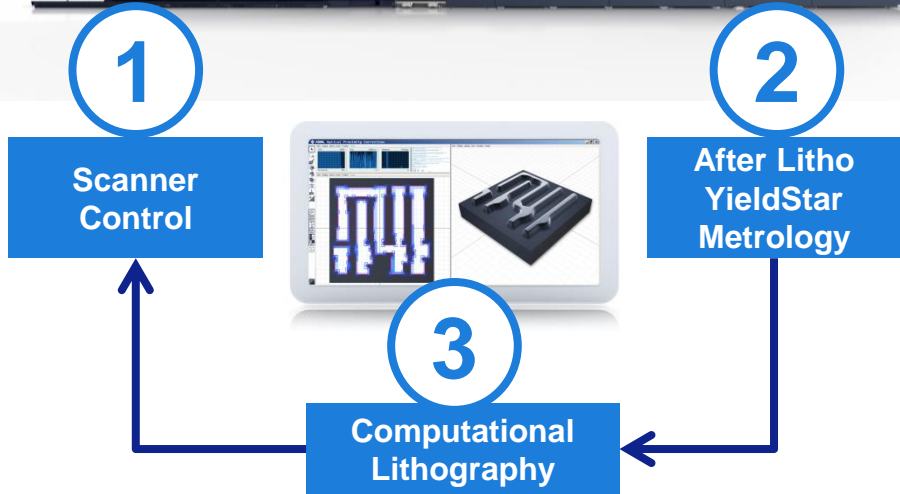
Scanner OVERLAY < 2 nm

What is the real overlay on customer products?

Holistic product value built on UNIQUE metrology, computational litho and scanner control abilities

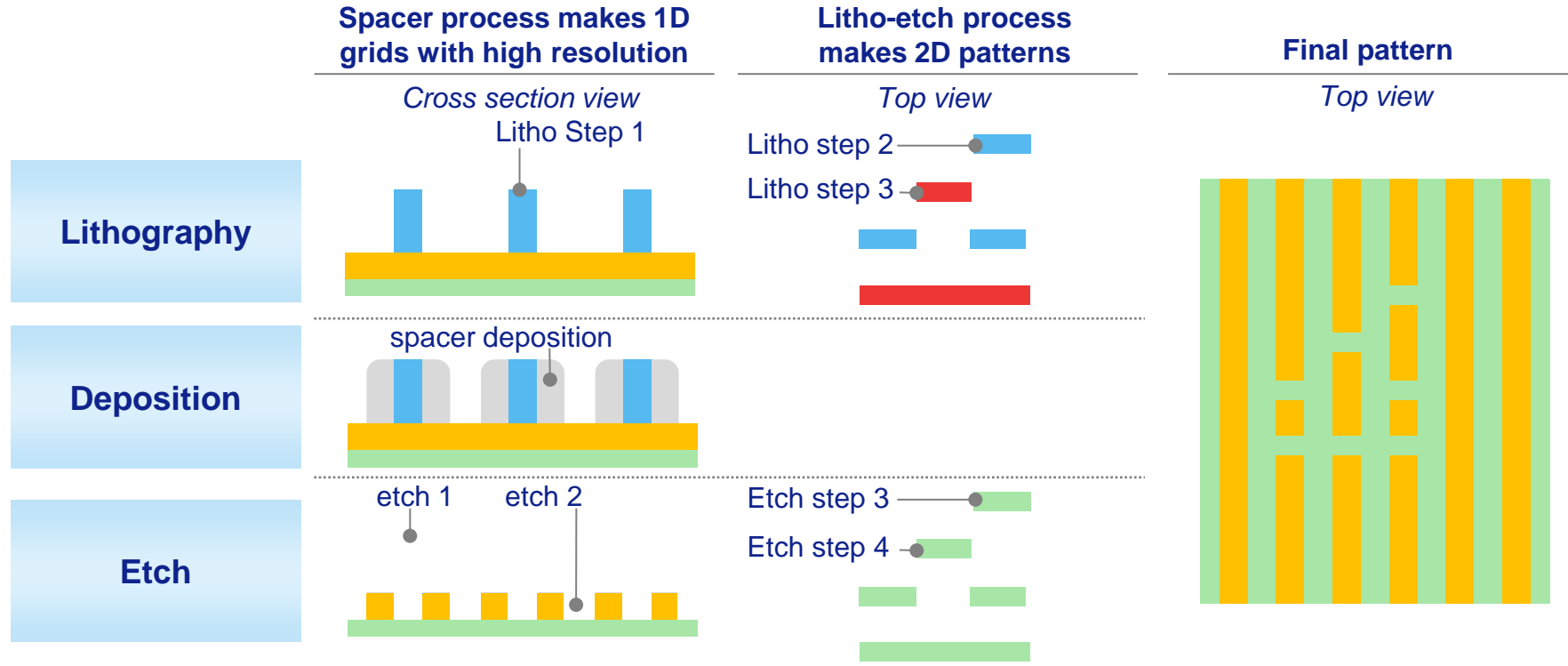


ASML holistic lithography at 1x nm node: Overlay Control



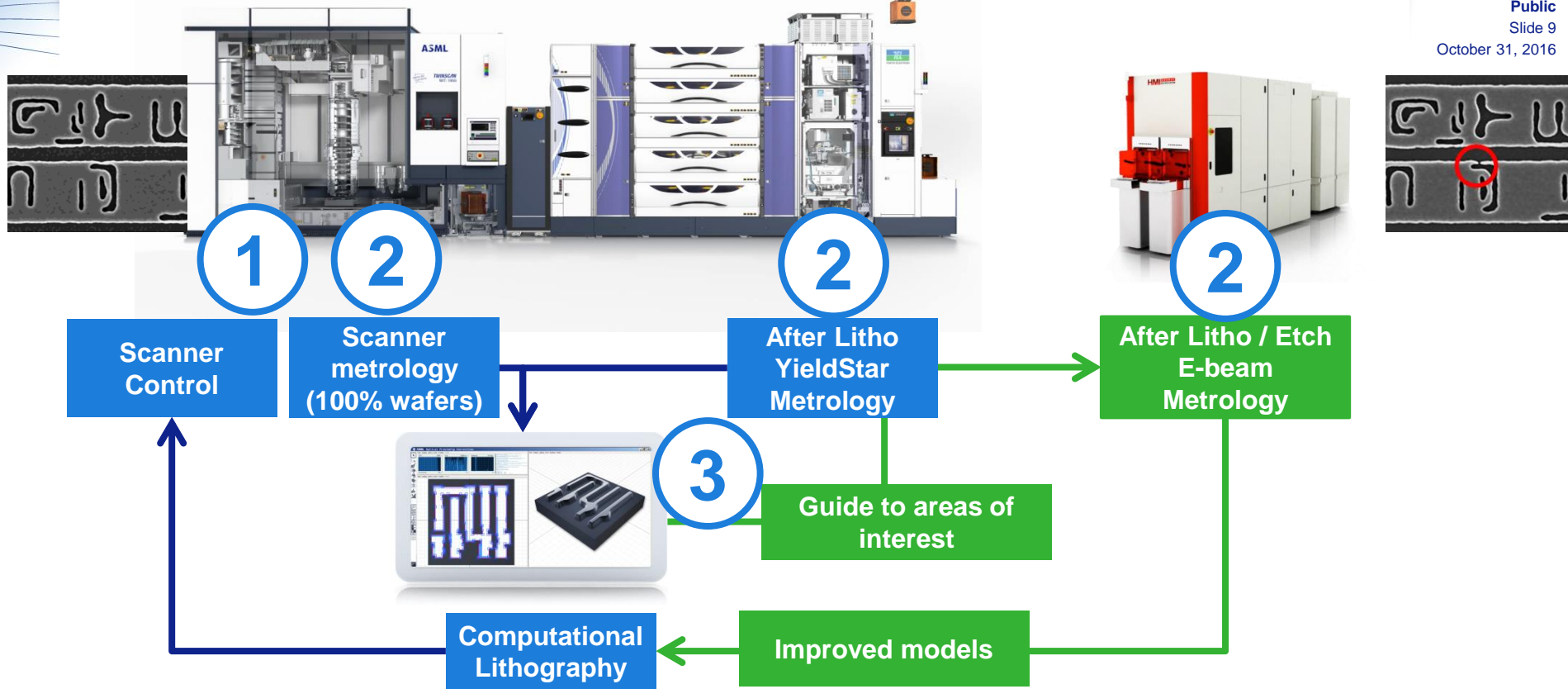
YieldStar metrology measures wafers after develop, data feeds computational lithography models for optimum scanner control

<10 nm node requires tight control of pattern fidelity to secure device yield and performance



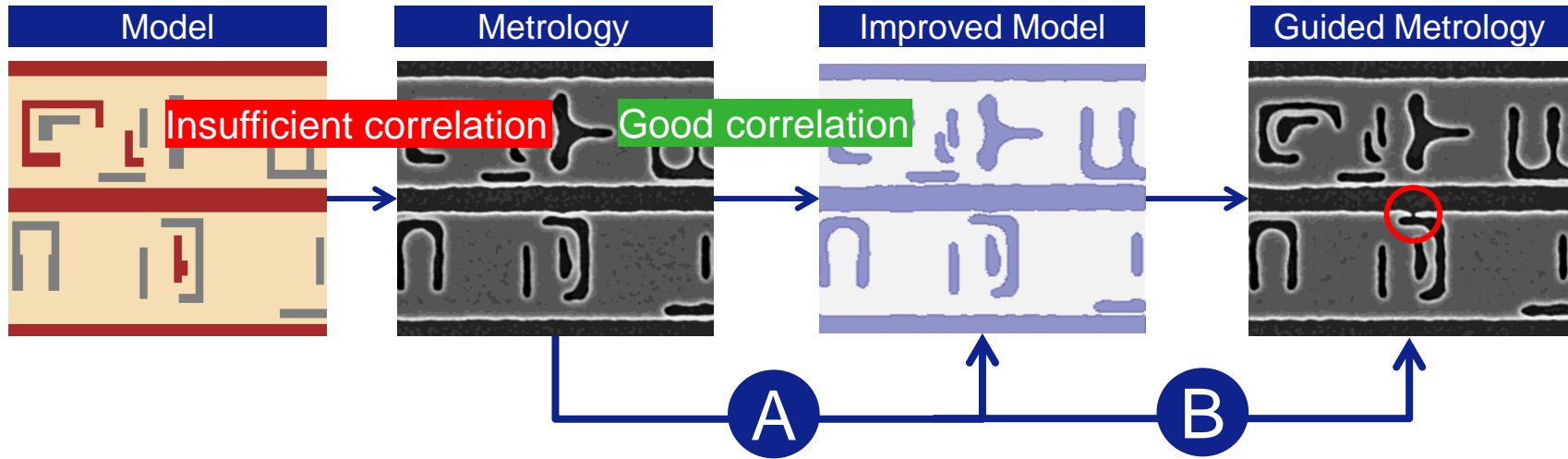
Pattern is created with multiple lithography and etch steps
All need to be controlled for pattern fidelity

ASML holistic lithography future - Pattern fidelity control



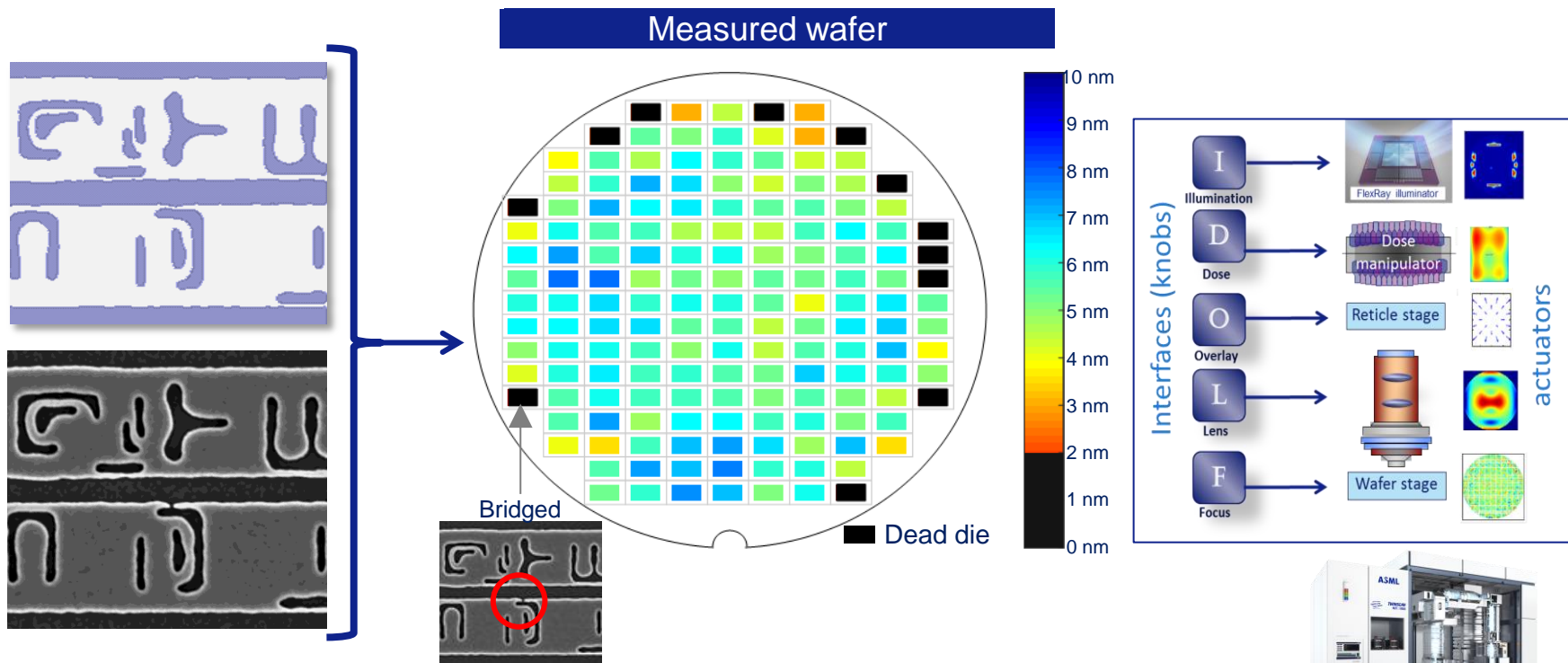
E-beam added: ASML model *guides* e-beam to *improve* coverage of critical pattern fidelity > e-beam data *enhances* model and *control* of scanner

Addition of E-beam will extend overall performance of Holistic Lithography



- A** High resolution E-beam metrology improves computational lithography models
 - Today >1 Million points measured to calibrate model
- B** Computational lithography models are used to drive metrology to area of interest
 - Today <0.1% of all wafers are measured after critical steps (Litho and Etch)

Addition of HMI technology will extend holistic lithography to pattern fidelity and interconnect control

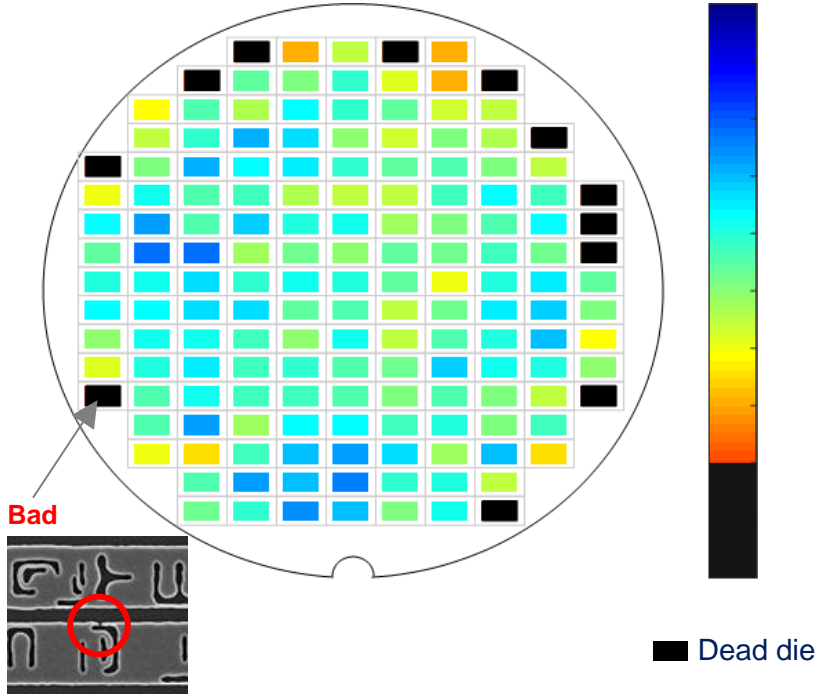


Metrology + computational models are being used to optimize the scanner operation

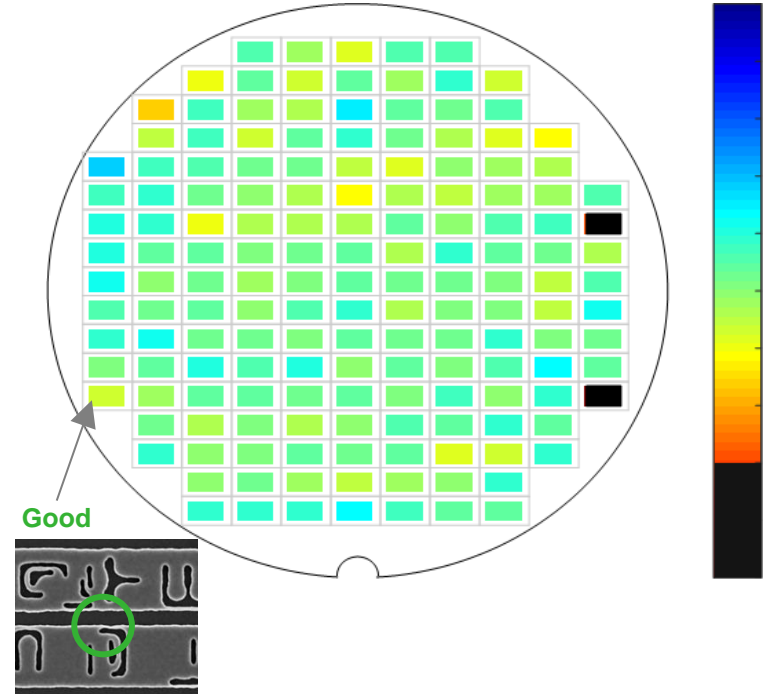


Holistic Lithography = Metrology + Computational models + Scanner knobs results in improved yield

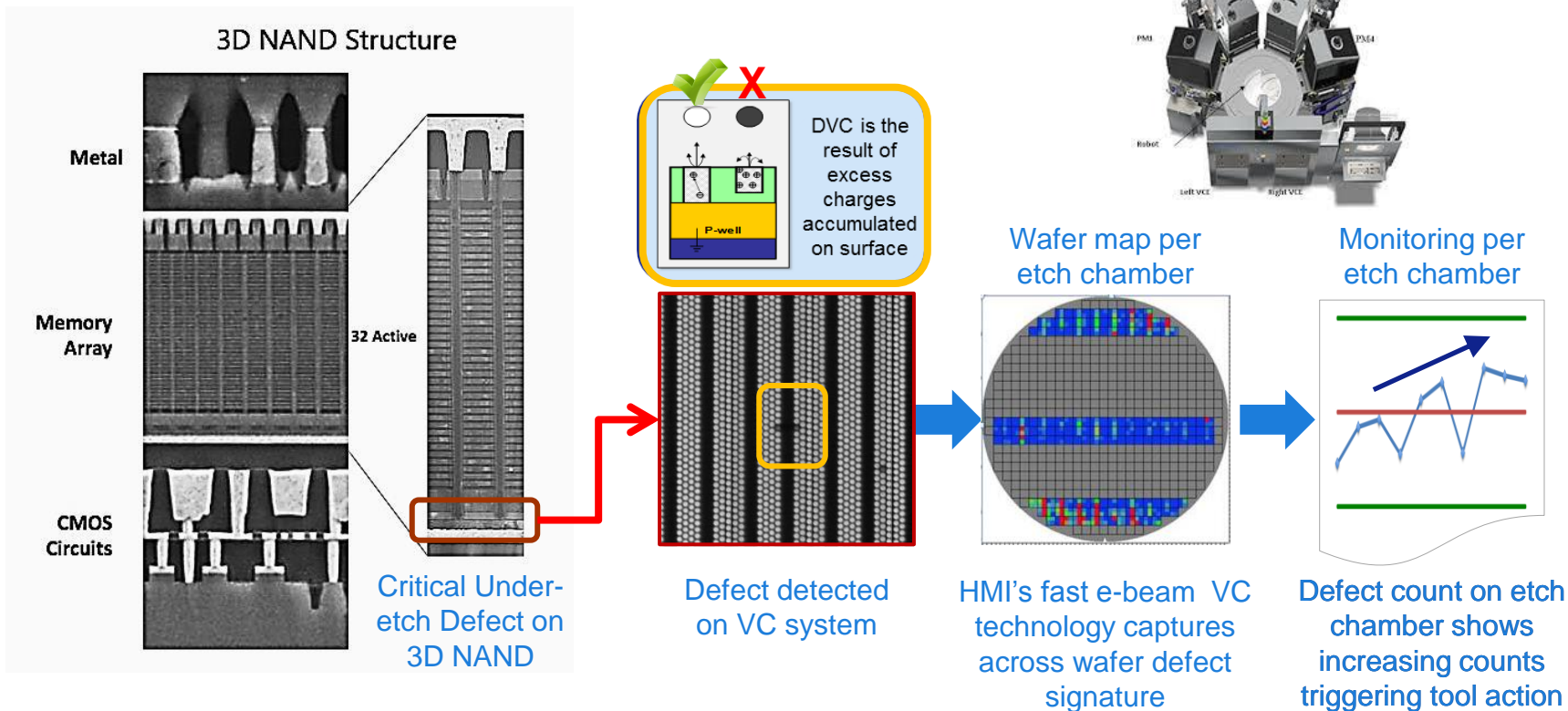
Uncorrected wafer



Corrected wafer

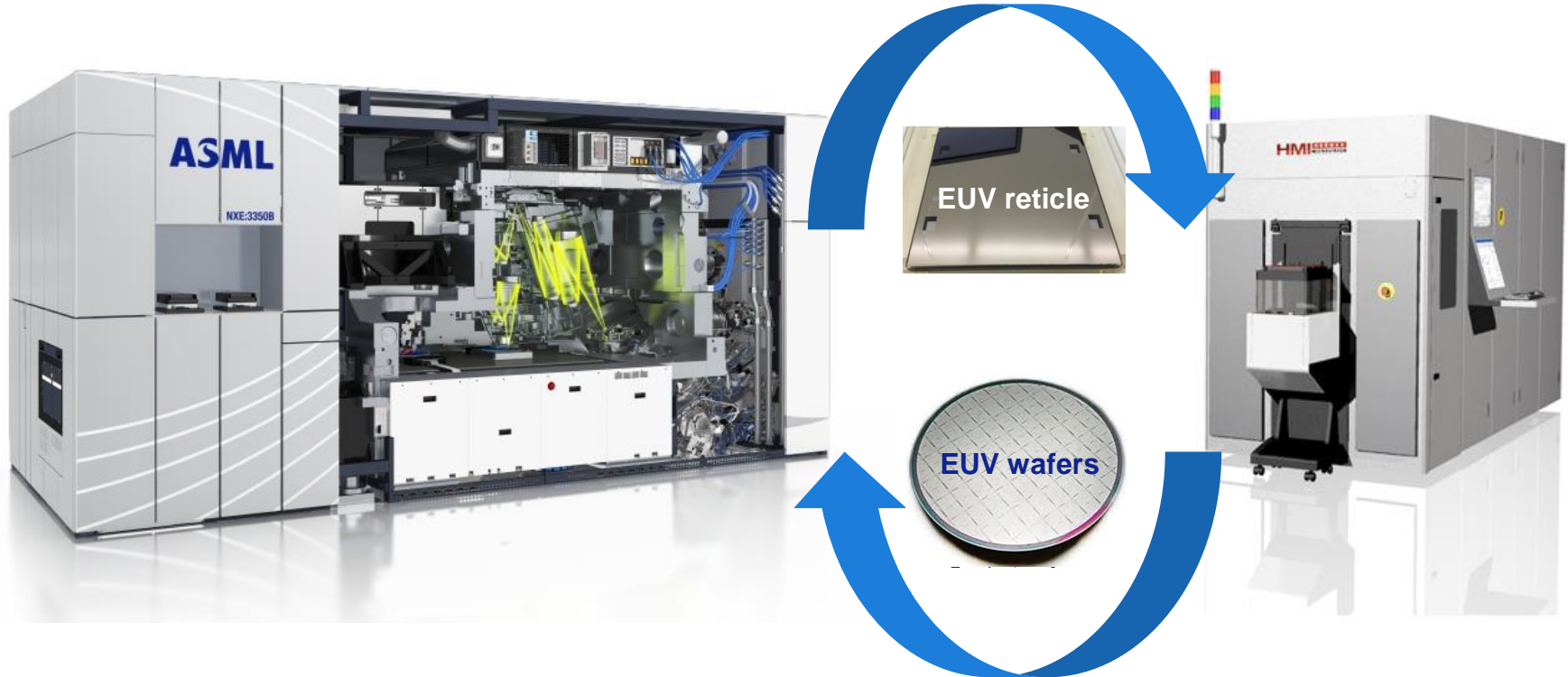


HMI Voltage contrast metrology opens unique control opportunity for 3D structures



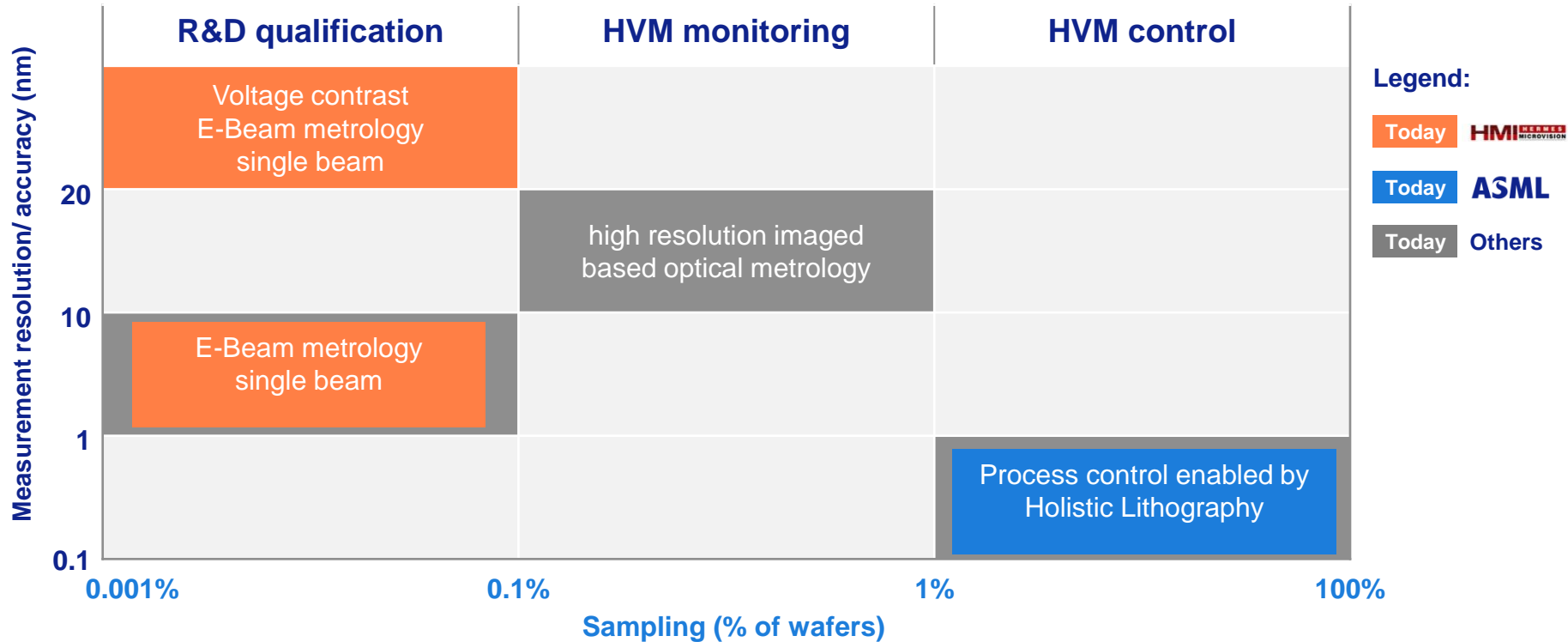
E-beam metrology systems that can identify defects on EUV production reticles and support EUV ramp

HMI/ASML addressable market EUR 200 million in 2020



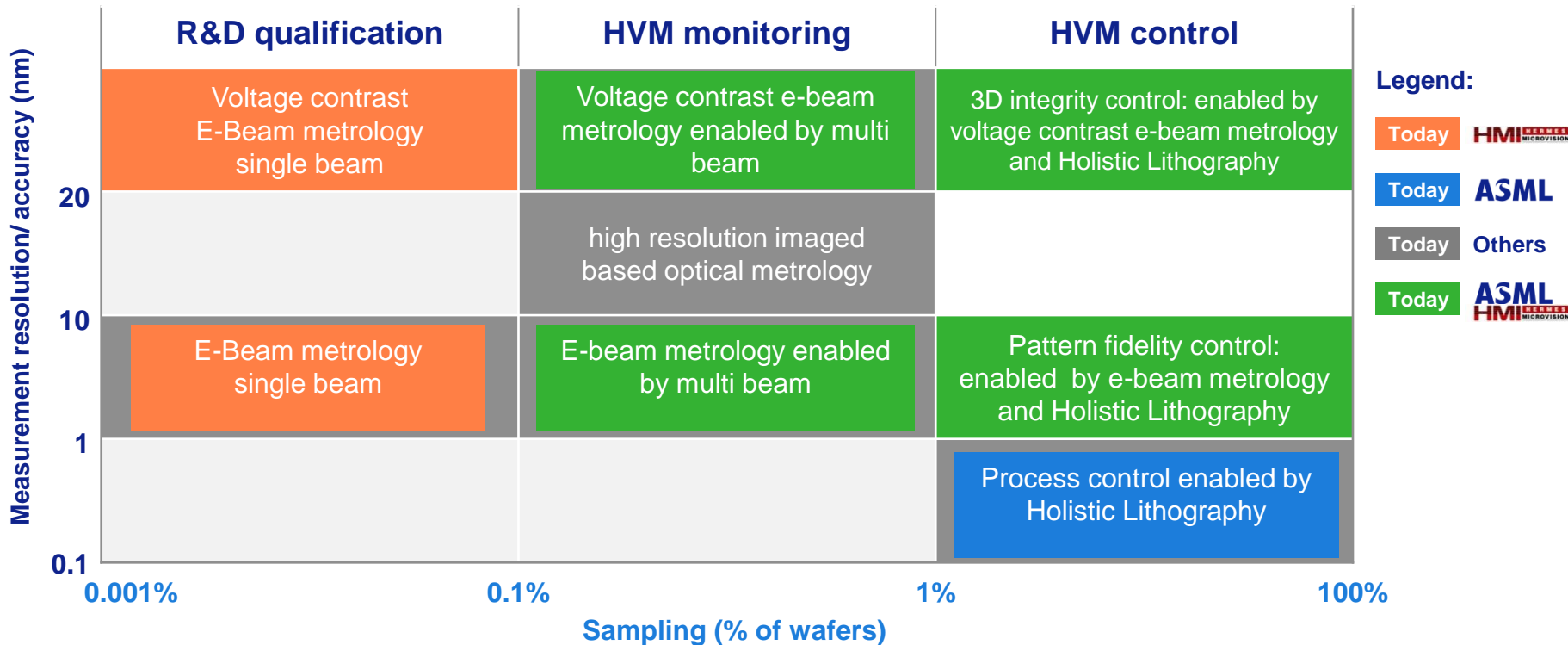
The qualification, monitoring and control landscape today

HMI/ASML addressable market EUR 0.7 billion (excluding bright field inspection)

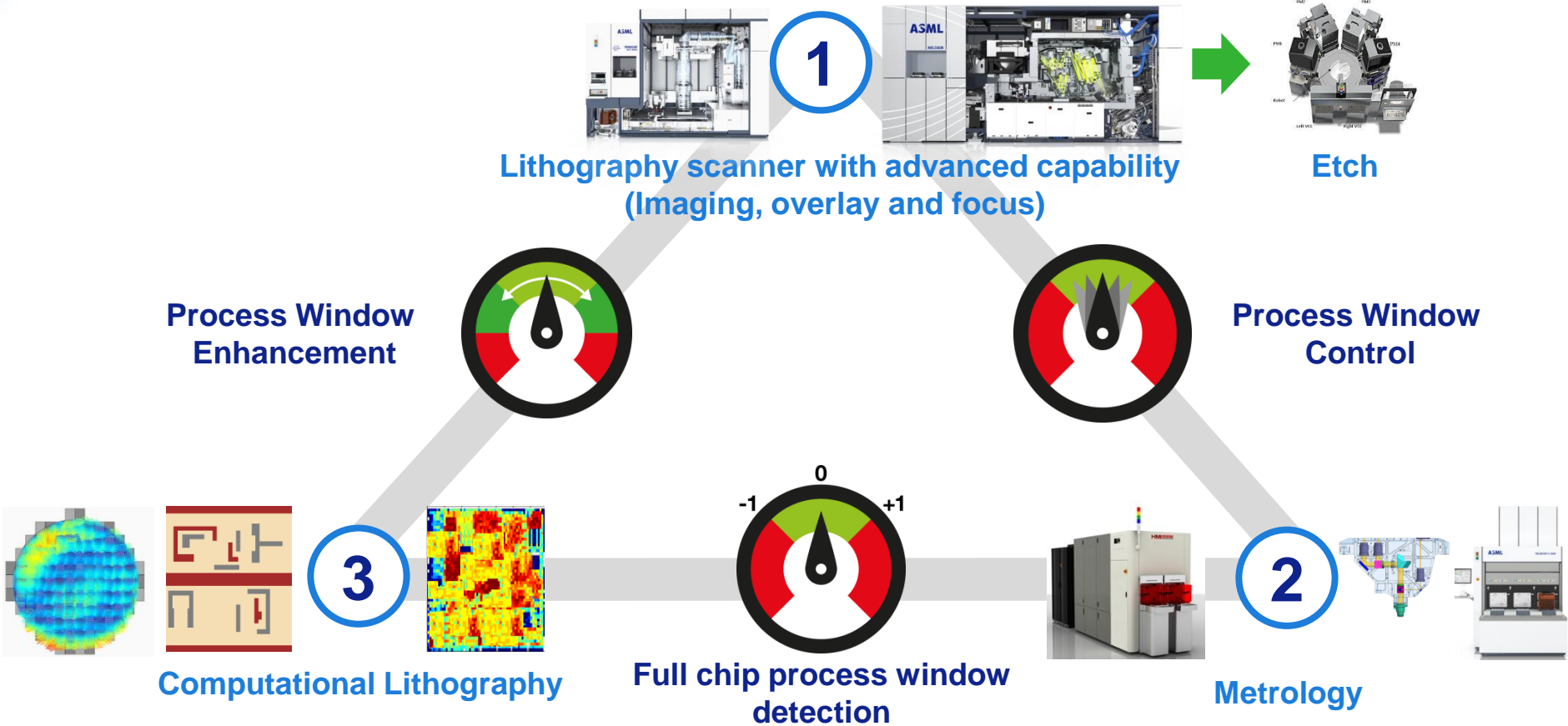


HMI e-beam metrology technology combined with ASML holistic lithography will boost customers control strategy

HMI/ASML addressable market EUR 2.3 billion in 2020



ASML Holistic Lithography approach seeks to maximize patterning process performance and control



Forward looking statements

This document contains statements relating to certain projections and business trends that are forward-looking, including statements with respect to our outlook, including expected customer demand in specified market segments (and underlying assumptions) including memory, logic and foundry, expected sales levels, trends, including trends towards 2020 and beyond and expected industry growth, and outlook, systems backlog, expected or indicative market opportunity, financial results and targets, including, for ASML and ASML and HMI combined, expected sales, other income, gross margin, R&D and SG&A expenses, capital expenditures, cash conversion cycle, EPS and effective annualized tax rate, annual revenue opportunity and EPS potential by end of decade and growth opportunity beyond 2020 for ASML and ASML and HMI combined, cost per function reduction and ASML system ASP, goals relating to gross cash balance and ASML's capital structure, customer, partner and industry roadmaps, productivity of our tools and systems performance, including EUV system performance (such as endurance tests), expected industry trends and expected trends in the business environment, the addition of value through delivery of lithography products and the achievement of cost-effective shrink, expected continued lithography demand and increasing lithography spend, the main drivers of lithography systems, lithography intensity for all market segments, customer execution of shrink roadmaps, future memory application distribution, expected addressable markets, including the market for lithography systems and service and options, expected manufacturing and process R&D, statements with respect to growing end markets that require fab capacity driving demand for ASML's tools, statements with respect to the acquisition of HMI by ASML, including market opportunity, the expected timing of completion of the HMI acquisition and delisting of HMI, the expected benefits of the acquisition of HMI by ASML, including expected continuation of year on year growth, the provision of e-beam metrology capability and its effect on holistic lithography solutions, including the introduction of a new class of pattern fidelity control and the improvement of customers' control strategy, statements with respect to EUV, including targets, such as availability, productivity, facilities and shipments, including the number of EUV systems expected to be shipped and timing of shipments, and roadmaps, shrink being key driver to industry growth, expected industry adoption of EUV and statements with respect to plans of customers to insert EUV into production and timing, the benefits of EUV, including expected cost reduction and cost-effective shrink, the expected continuation of Moore's law, without slowing down, and that EUV will continue to enable Moore's law and drive long term value, goals for holistic lithography, including pattern fidelity control, expectations relating to double patterning, immersion and dry systems, intention to return excess cash to shareholders, statements about our proposed dividend, dividend policy and intention to repurchase shares and statements with respect to the current share repurchase plan. You can generally identify these statements by the use of words like "may", "will", "could", "should", "project", "believe", "anticipate", "expect", "plan", "estimate", "forecast", "potential", "intend", "continue" and variations of these words or comparable words. These statements are not historical facts, but rather are based on current expectations, estimates, assumptions and projections about the business and our future financial results and readers should not place undue reliance on them.

Forward-looking statements do not guarantee future performance and involve risks and uncertainties. These risks and uncertainties include, without limitation, economic conditions, product demand and semiconductor equipment industry capacity, worldwide demand and manufacturing capacity utilization for semiconductors (the principal product of our customer base), including the impact of general economic conditions on consumer confidence and demand for our customers' products, competitive products and pricing, the impact of any manufacturing efficiencies and capacity constraints, performance of our systems, the continuing success of technology advances and the related pace of new product development and customer acceptance of new products including EUV, the number and timing of EUV systems expected to be shipped and recognized in revenue, delays in EUV systems production and development, our ability to enforce patents and protect intellectual property rights, the risk of intellectual property litigation, availability of raw materials and critical manufacturing equipment, trade environment, changes in exchange rates, changes in tax rates, available cash and liquidity, our ability to refinance our indebtedness, distributable reserves for dividend payments and share repurchases and timing of resumption of the share repurchase plan, and other risks indicated in the risk factors included in ASML's Annual Report on Form 20-F and other filings with the US Securities and Exchange Commission. These forward-looking statements are made only as of the date of this document. We do not undertake to update or revise the forward-looking statements, whether as a result of new information, future events or otherwise.

ASML

INVESTOR DAY

ASML **SMALL** **TALK** **2016**

NEW YORK CITY

