The Opportunities and Challenges of Bringing New Metrology Equipment to Market

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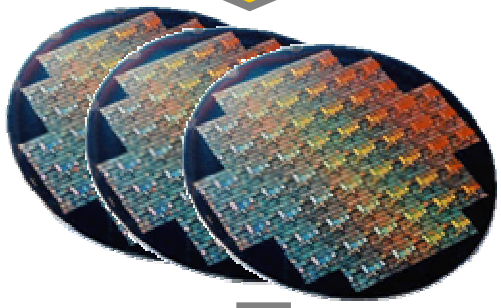
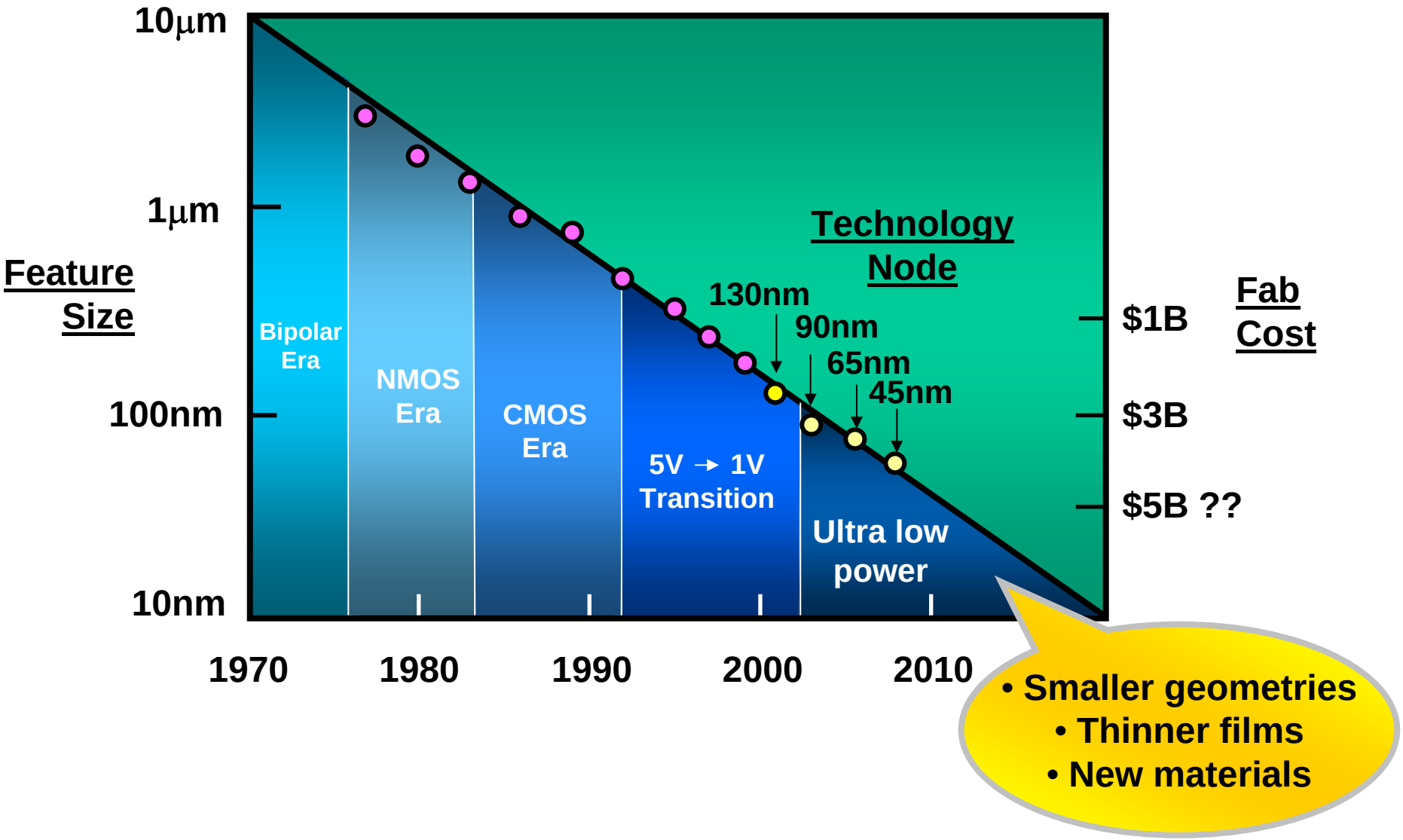
Consumer applications drive the $175B semiconductor market

Low Cost is Critical !!

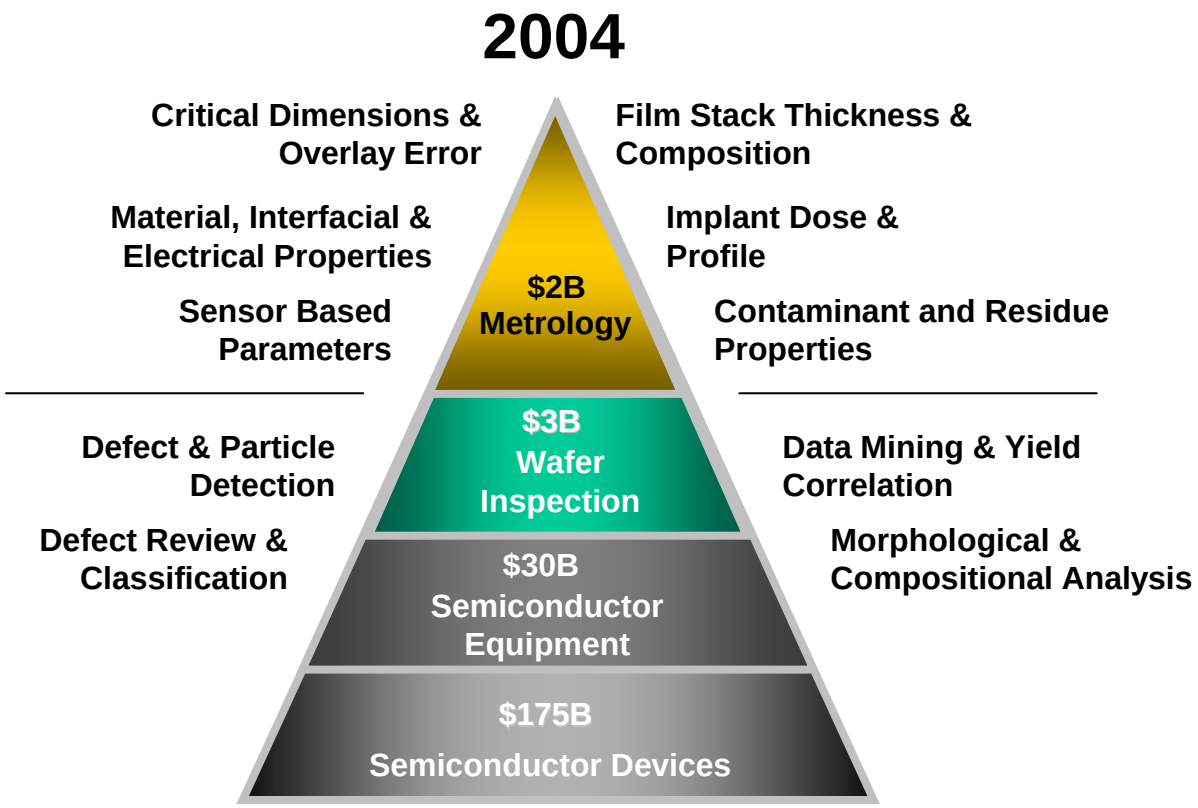


The Digital Consumer Revolution

Higher speed and lower power fuels the $30B equipment market

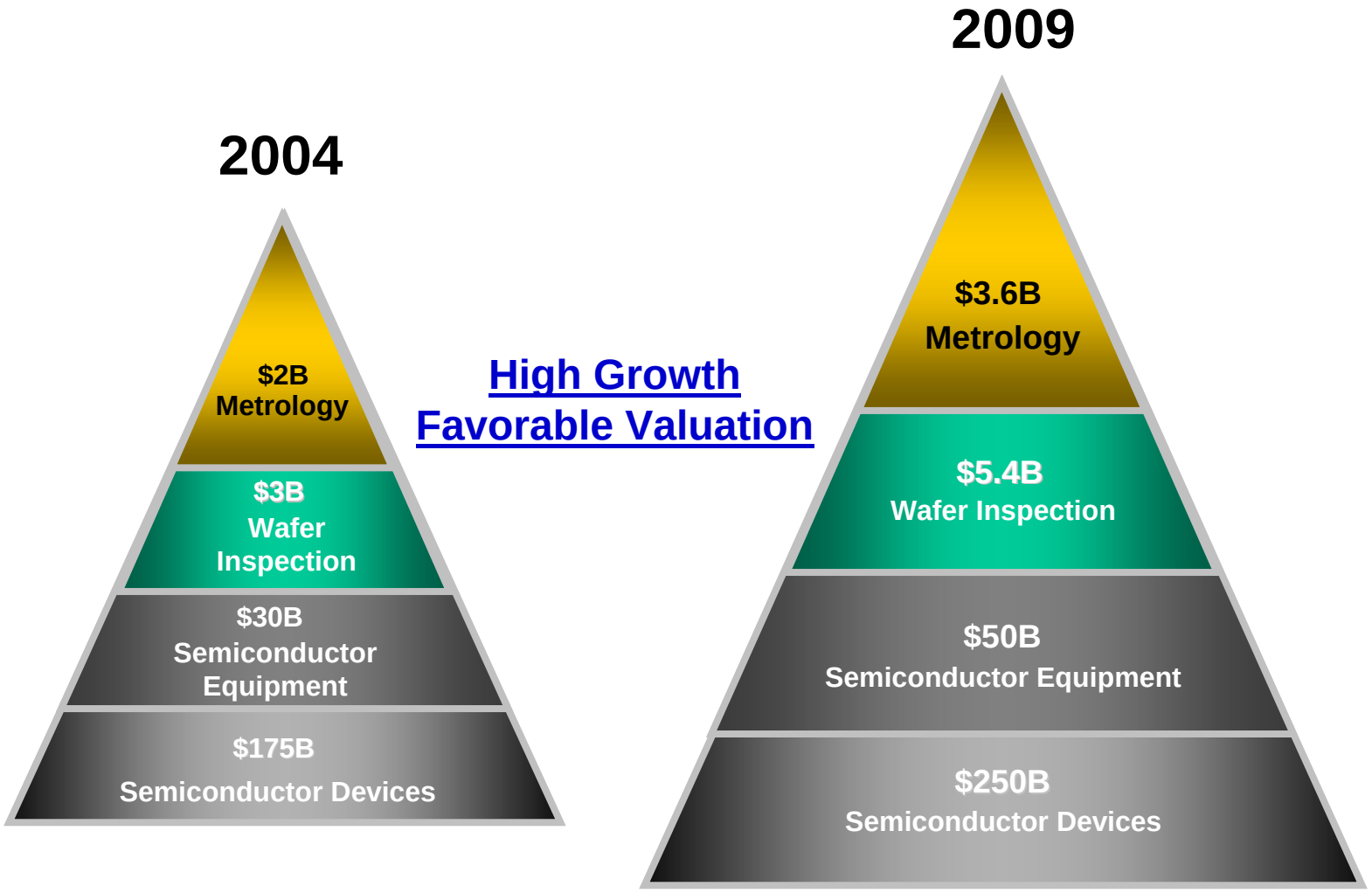


Metrology and inspection represent a significant share of semiconductor equipment



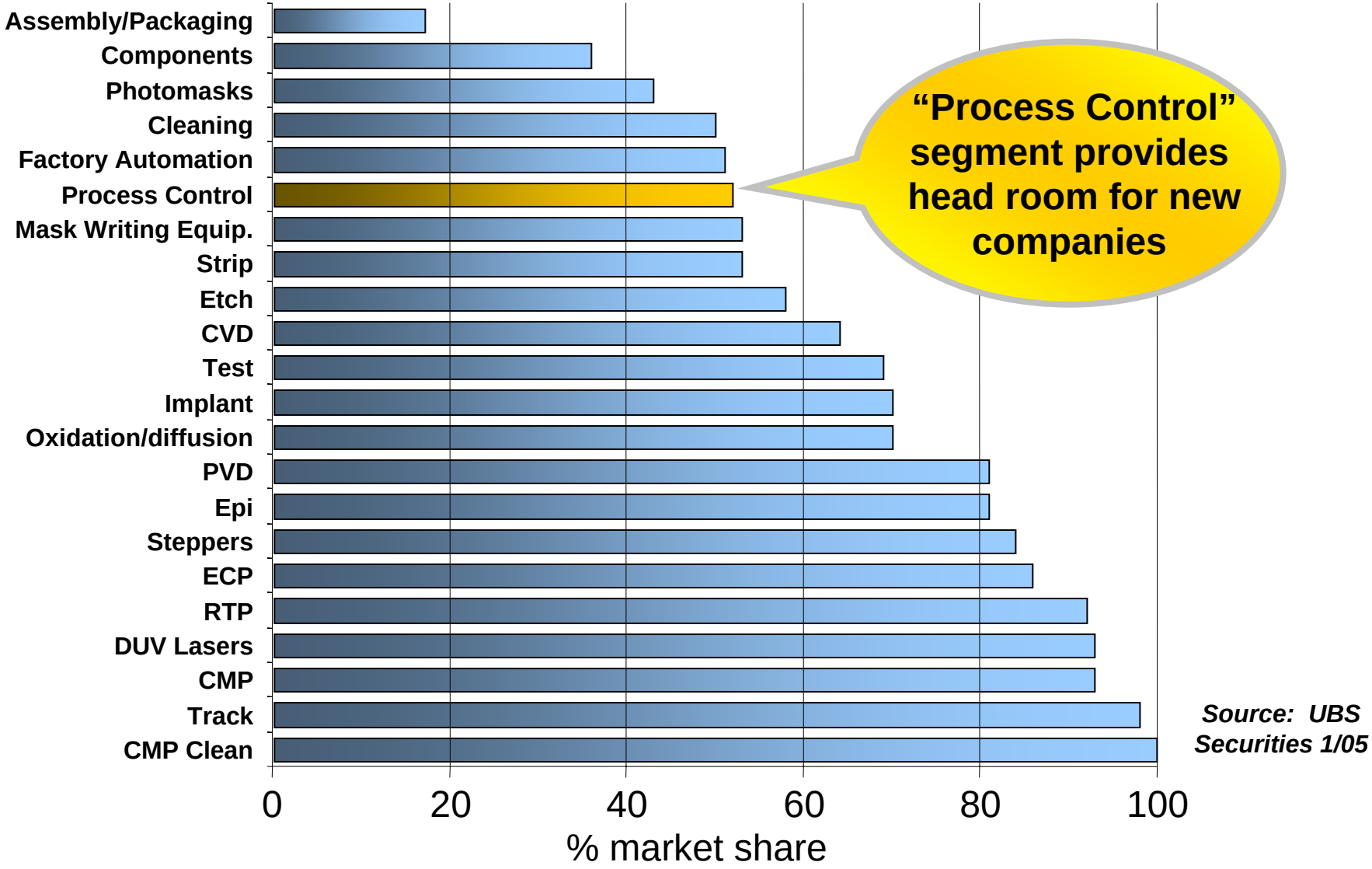
Source: VLSI Research 8/04

Metrology and inspection represent a significant share of semiconductor equipment (cont.)



Source: VLSI Research 8/04

Market share of top two suppliers by industry segment



New metrology and inspection companies continue to emerge

- Next generation process and device technology provide new opportunities
  - Smaller geometries
  - New materials
  - Integration challenges
- Semiconductor chip manufacturers actively encourage fresh approaches and are willing to work with new suppliers to refine their product offerings and business practices

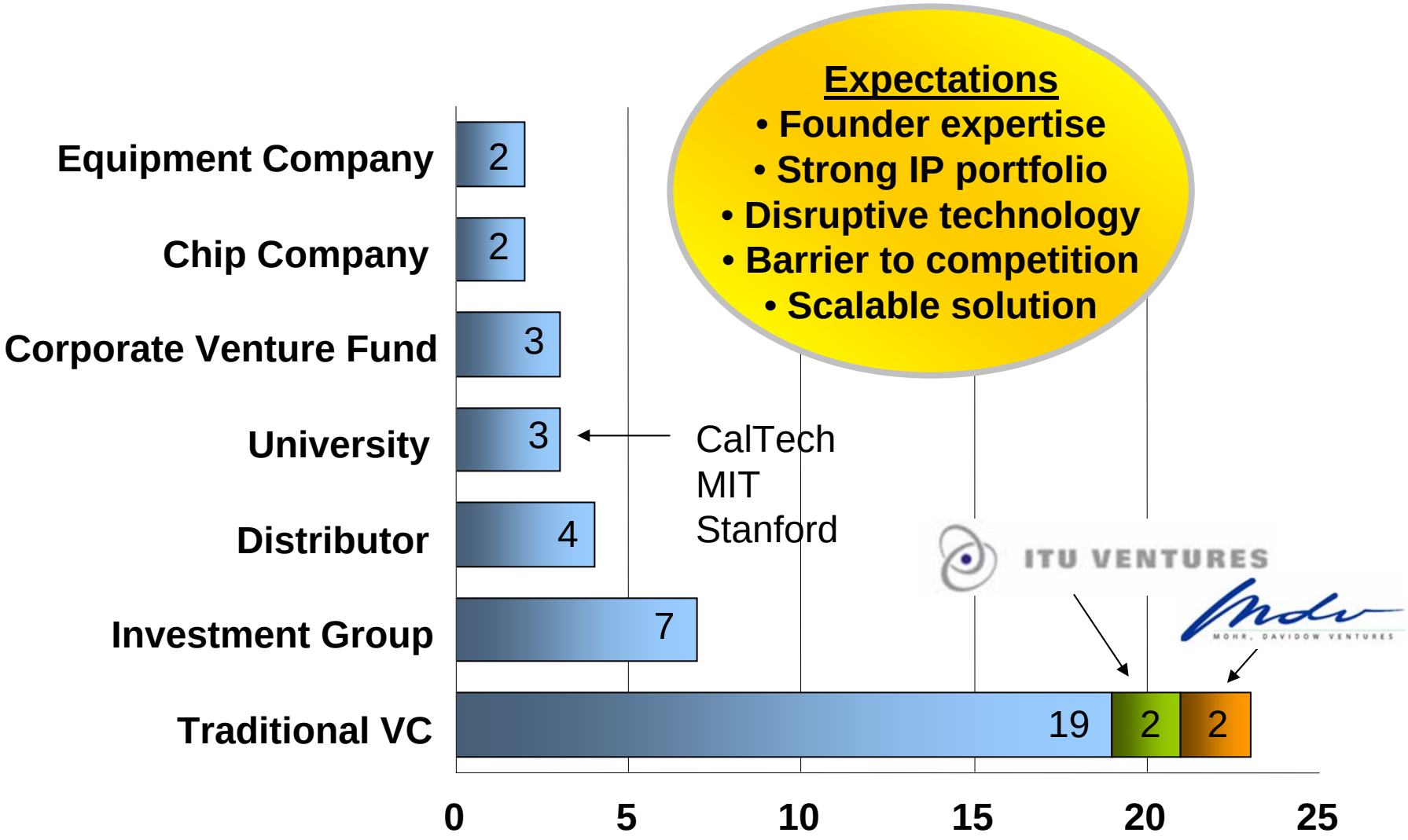
The barrier to entry is high, but not insurmountable!

Venture backed metrology companies (since 2000)

	Company	Application area	Founded	Funded	Stage
IMAGO SCIENTIFIC INSTRUMENTS	Imago Scientific Instruments	Three-dimensional atomic scale imaging	1999	2000	Shipping product
Metara	Metara, Inc.	Trace contaminants and chemical constituents	1996	2002	Shipping product
nLine	nLine Corporation	Inspection and test equipment	1999	2000	Restart
ONWAFER TECHNOLOGIES	OnWafer Technologies	Wafer-based metrology systems	2000	2002	Shipping product
ORAXION DIAGNOSTICS	Oraxion Diagnostics	Wafer deformation, flatness and stress	2000	2004	Shipping product
PIVOTAL SYSTEMS	Pivotal Systems	Process control solutions for semiconductor manufacturing	2003	2004	Shipping product
Qcept Technologies	Qcept Technologies	Chemical metrology solutions on semiconductor wafers	2000	2003	Product development
ReVera™	ReVera Inc.	Thickness and composition of hyper thin films	2004	2004	Shipping product

Source: Dow/Jones Venture Source

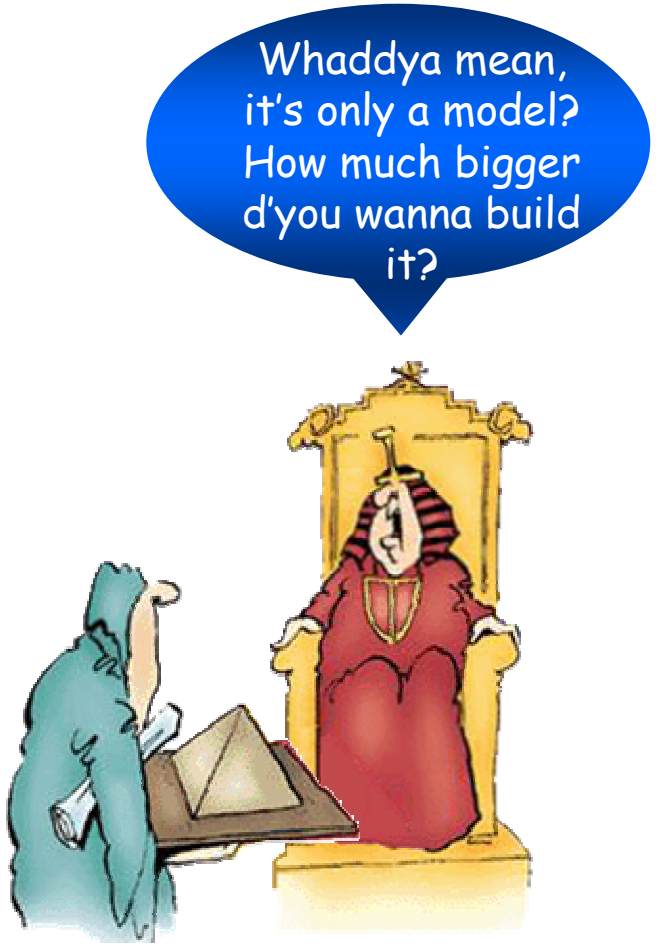
Sources of investment



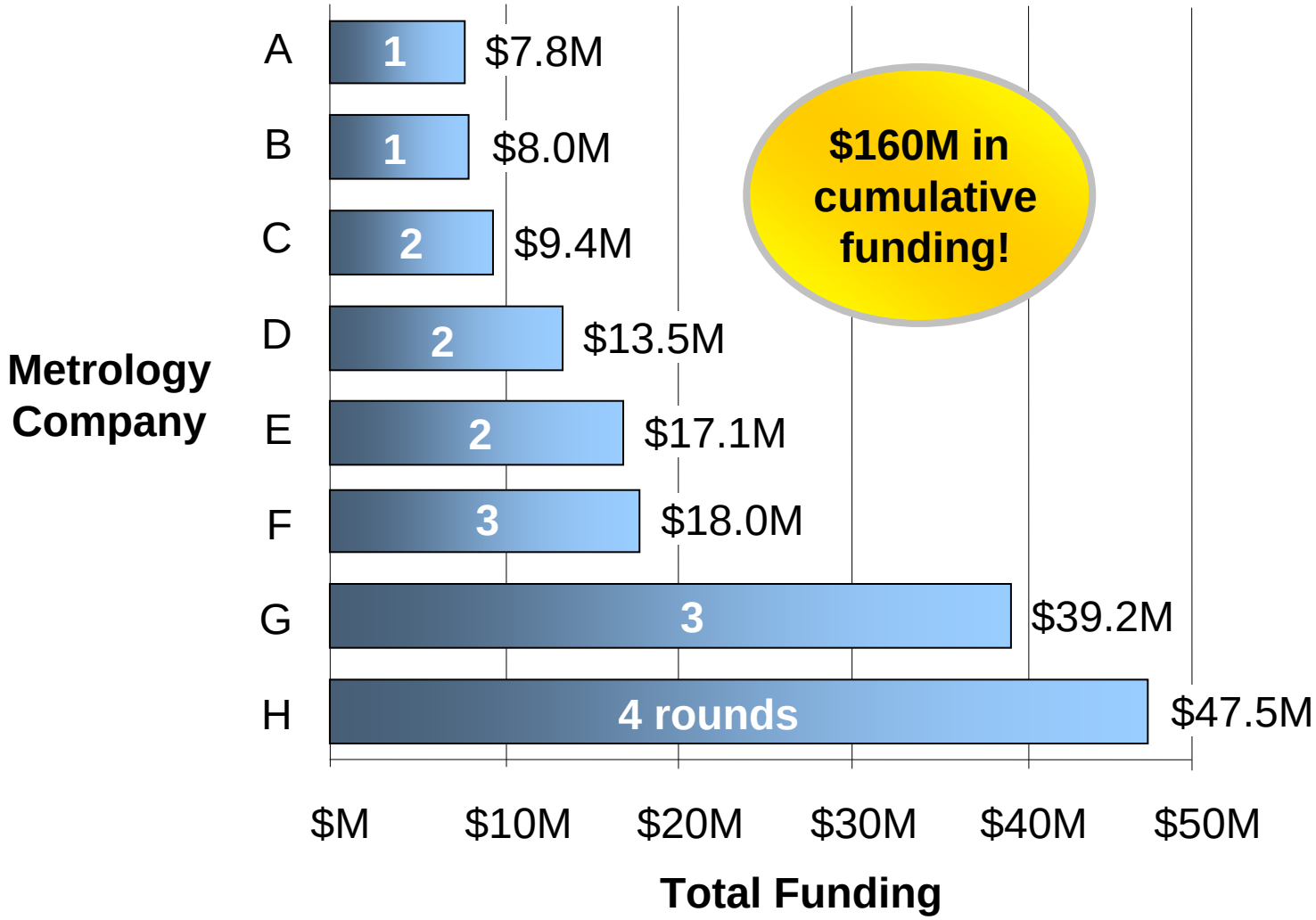
Investors need to be educated about the metrology equipment market

- Concentrated customer base
- Lengthy product development cycle
- Perceived dominant competition
- Difficulty establishing enterprise value in relation to other industries
- Uncertainty about timing and method of achieving liquidity

Investors have many other options!

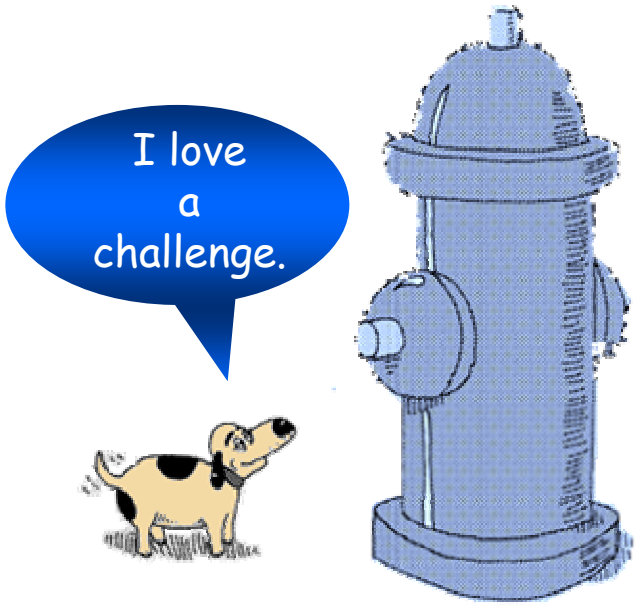


Emerging metrology companies need substantial funding



Challenges facing emerging metrology companies

- Transitioning from a laboratory or research mindset to in-line manufacturing
- Blending an experienced management team with core technologists
- Identifying clear needs in the market to drive initial equipment demand and long term growth
- Winning business at leading edge semiconductor manufacturers
- Supporting customers both pre- and post-sales with applications expertise and rapid response to changing requirements



Serving a global market

Serving a global market (cont.)

The emerging company must be capable of selling, servicing and supporting its products throughout the world

Case Studies

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Case Study I: *Imago Scientific Instruments*

THE UNIVERSITY of WISCONSIN MADISON

- Materials Science Center
- Atom probe microscope for research and scientific applications
- Publications and IP
- Founder

IMAGO SCIENTIFIC INSTRUMENTS

- 3D Atom Probe for micro structural characterization

- $$
- Guidance
- Relationships
- Executive Team Recruiting

Draper Fisher Jurvetson

Infineon technologies

Draper Triangle Ventures

PORTAGE

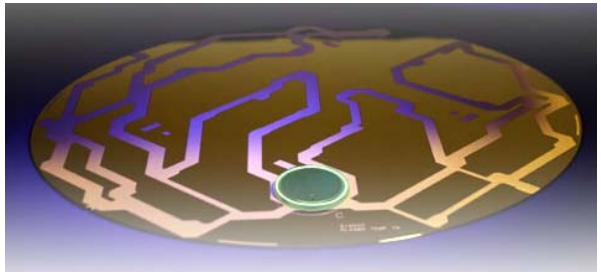
Source: Tim Stultz

Case Study II: *OnWafer Technologies*

UC Berkeley
Computer-Aided Manufacturing
Berkeley Microfabrication Laboratory

- **Basic pre-IP concept**
- **Original Experimental Work**
- **Refereed Publications**
- **Founders**

ONWAFER TECHNOLOGIES



- **World-wide proliferation of Wireless, Zero-Footprint Metrology**

- **$$**
- **Guidance**
- **Relationships**
- **Executive Team Recruiting**

ITU VENTURES

North Bay Angels

MDV MOHR, DAVIDOW VENTURES

NEWBURY VENTURES

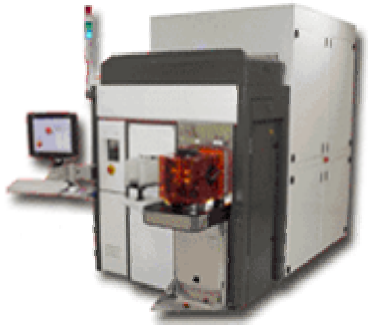
Source: Rod Browning

Case Study III: *ReVera Inc.*

Physical Electronics

- Products
- IP
- Employees

ReVera



- In-line compositional metrology for hyper thin films

- $$
- Guidance
- Relationships

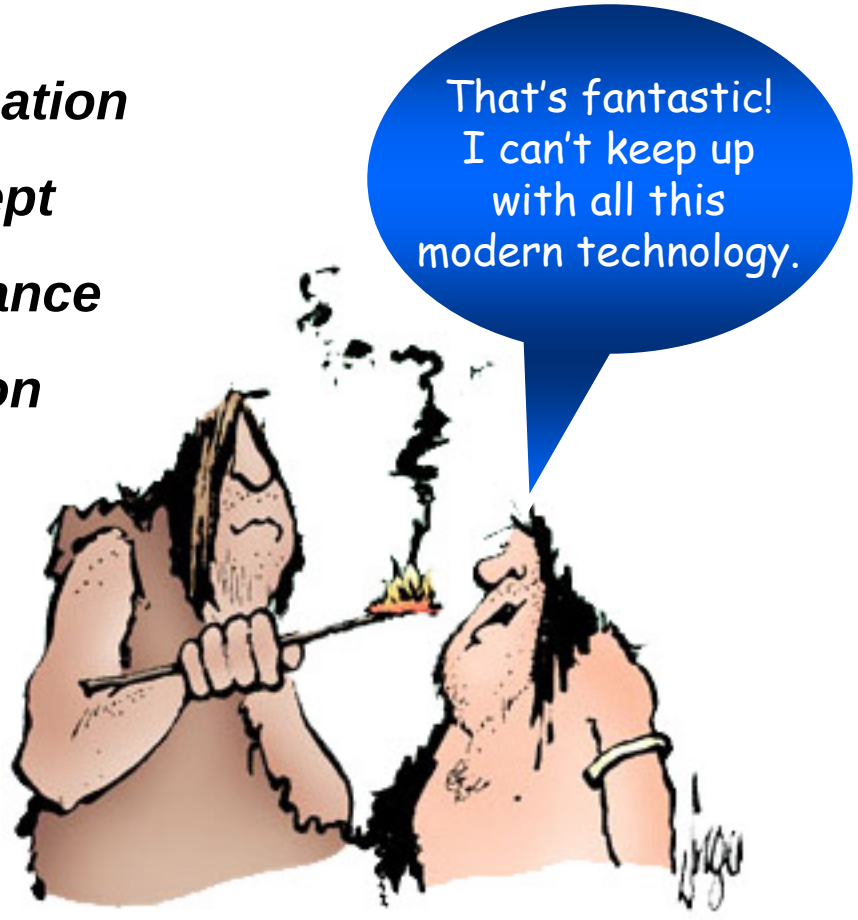
CROSSLINK CAPITAL

ATA VENTURES

Source: Dave Ring

The Four Business Stages

- Stage 1: ***Business Formation***
- Stage 2: ***Proof-of-Concept***
- Stage 3: ***Market Acceptance***
- Stage 4: ***Stable Operation***



Stage 1: *Business Formation*

- Seed capital in the range of $500K to $1M is used to assemble the start up team
- Experienced legal and accounting resources are engaged
- Common stock is distributed among the founders
- Market need and product direction are defined

Stage 2: *Proof-of-Concept*

- Investment capital in the range of $4M - $5M is obtained from outside investors to reach “demo-readiness”
- Preferred stock is issued that establishes relative ownership among the parties
- The company’s valuation is determined (# of shares x $ per share)
- Founders may move to key technology roles, while an experienced CEO is brought on board to manage the company

Stage 3: *Market Acceptance*

- An additional round of $8M - $10M may be needed to achieve broad market acceptance
- Key challenges facing the company are
  - **Fully meeting design objectives and specifications for the first generation product**
  - **Developing a suite of applications that broaden tool use or open new market opportunities**
  - **Introducing follow-on products that maintain a competitive edge in the marketplace**
  - **Providing 7 x 24 x 365 worldwide customer support assuring full system utilization and up-time**

Stage 4: *Stable Operation*

- In this stage, the company has gained market acceptance for its products, but the need for capital may persist
- Non-equity sources of financing can help deal with the challenges of inventory and accounts receivable
- Investors may grow impatient to see a return on capital, and typically prefer an Initial Public Offering (IPO) as a vehicle to "liquidity" for founders and investors

Acquisition by an established equipment supplier is the most likely outcome for metrology and inspection start ups

Significant merger, acquisition and IPO events since 1995

Company	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
ADE			Ph. Shift						$14M	
Applied Mats.	Opal & Orbot			$31M		Schlum-berger*		Boxer Cross		
August		$162M					IPO	STI	$160M	Merger ?
Nanometrics			Mera			$40M				
Nova					IPO					
KLA-Tencor		Tencor Instr.	Quantox / Amray			Phase Metrics			Candela / Inspex	
Philips	$1.17B		Act. Imp.		$77M			$24M		
Rudolph				IPO		$180M	ISOA			
ThermaWave					IPO		Sensys			
TEL	$120M			$206M		Timbre		$67M		
Veeco		Wyko Instr.	Digital Instr.							

VC Funded Metrology Startups										
	Sensys	B.Cross	IMAGO SCIENTIFIC INSTRUMENTS	ORAXION DIAGNOSTICS						
	Metara	Candela	nLine	Qcept Technologies			ONWAFER TECHNOLOGIES	PIVOTAL SYSTEMS	ReVera	

Concluding remarks

- The total available market for metrology and inspection equipment in 2004 was approx. $5B, with anticipated growth to $9B by 2009, making this an attractive market for venture investment.
- The metrology and inspection market is quite fluid, with 4 IPOs and 19 significant mergers and acquisitions since 1996, while during the same time period 12 start up metrology and inspection companies were receiving first-time venture funding.
- It will take on the order of $20M, involving multiple rounds of investment, to bring a metrology or inspection company from start-up to stable operation.
- Venture capital companies tend to invest in only one metrology or inspection company at any time, making raising capital an ongoing, time consuming effort.

Acknowledgements

- Dave Ring, CEO, Revera Inc.
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