

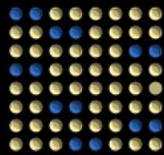
Microarray Production: Implementing Automation

Patrick Yau

pyau@microarrays.ca

3rd Annual Ontario Microarray Symposium

Nov. 11-13, 2003



UHN Microarray Centre

The Tornado Continues



... moves technology beyond early adopters into mainstream market.

~ *Geoffrey A. Moore*



We're on the radar

The Scientist :: The State of the Microarray, Feb. 10, 2003 - Microsoft Internet Explorer

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The State of the Microarray

By Aileen Constans

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By all accounts the genomics research community has embraced nucleic acid microarrays. San Jose, Calif.-based growth consulting firm Frost & Sullivan estimates that the market will grow at an annual compounded growth rate of 63% between 1999 and 2004--from \$232 million (US) to \$2.6 billion.¹ Revenue for related equipment such as arrayers and scanners topped the \$500 million mark in 2002, says Frost & Sullivan, and is projected to grow to almost \$2 billion by 2008.²

Some credit for this revolution must go to the tools' manufacturers, who seem to have a knack for giving their customers exactly what they want, whether it be chip sets

2003 RECAST

http://multi1.rmuk.co.uk/RealMedia/ads/click_lx.ads/www.the-scientist.com/566072513/Top/biomed/Bio_IT_World_Q1-03/bio_med.html Internet



We're on the radar

LAB CONSUMER

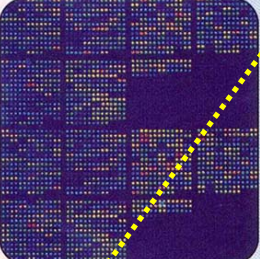
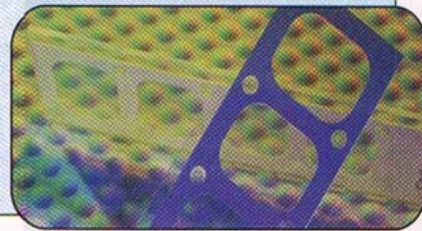
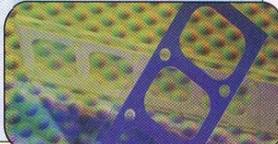
SELECTED SUPPLIERS OF MICROARRAY CHIPS, SPOTTERS, AND READERS

Note: a = arrays; r = reader; s = spotter

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The Scientist

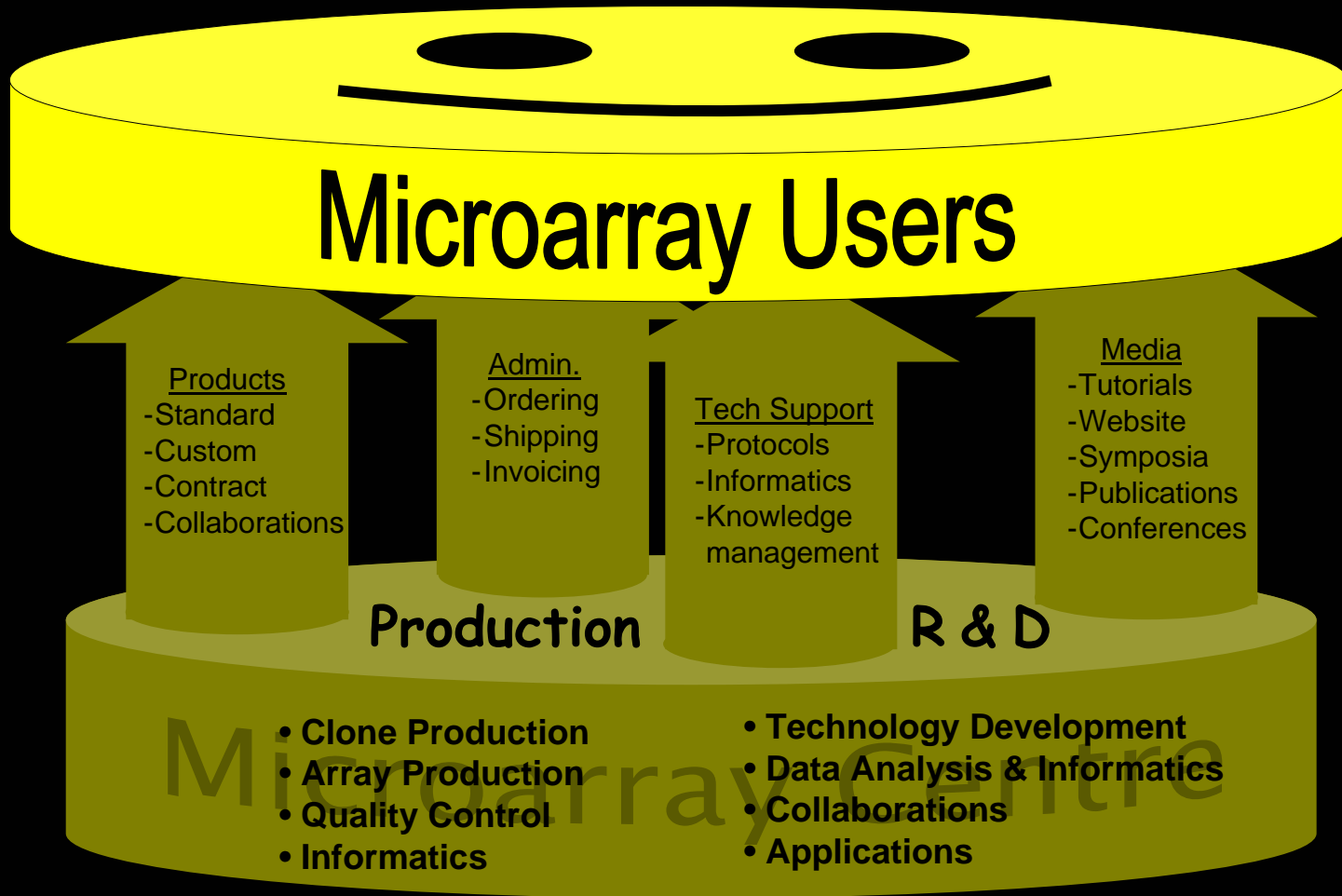




4 Q's in Production

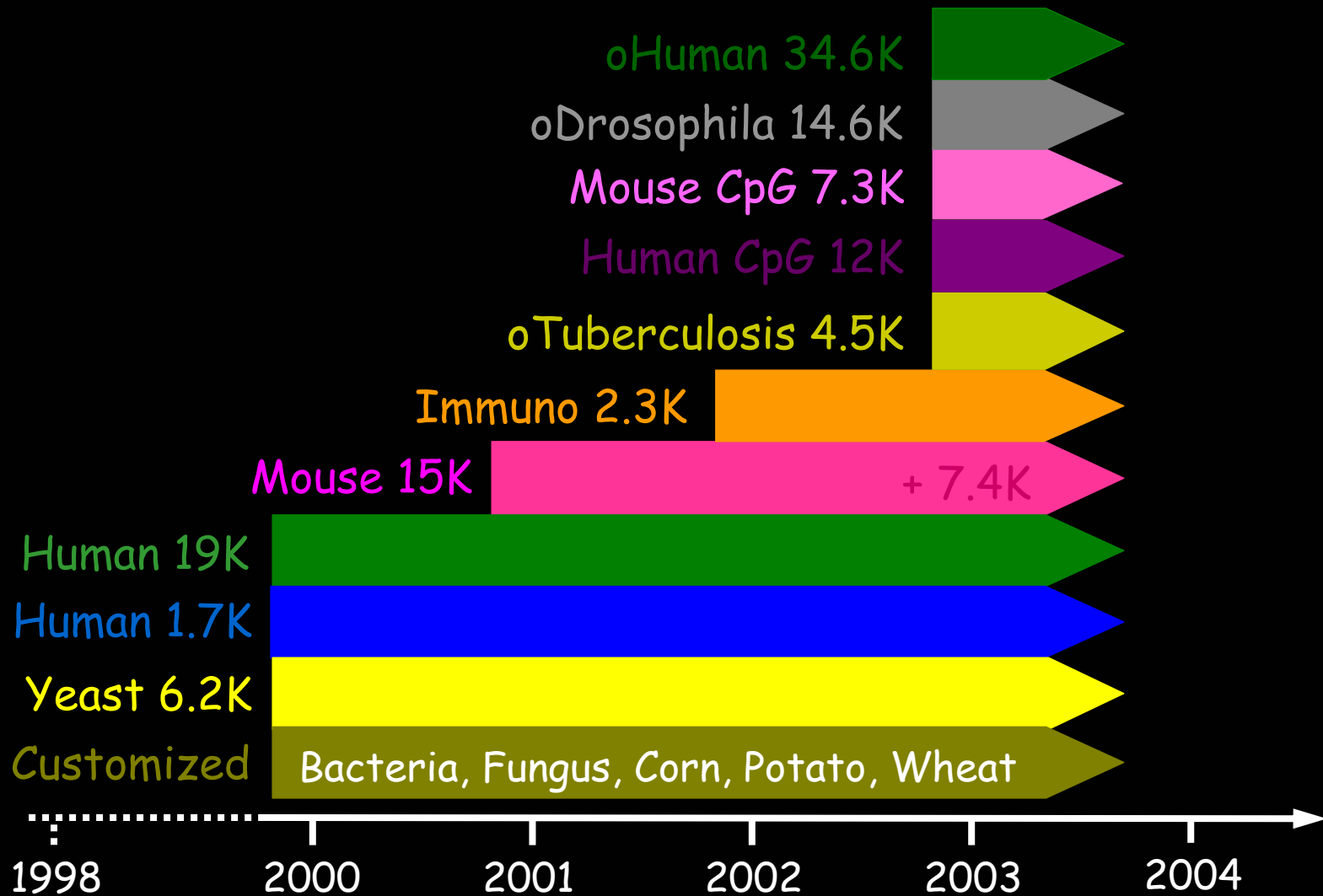
Queries



The Microarray Centre

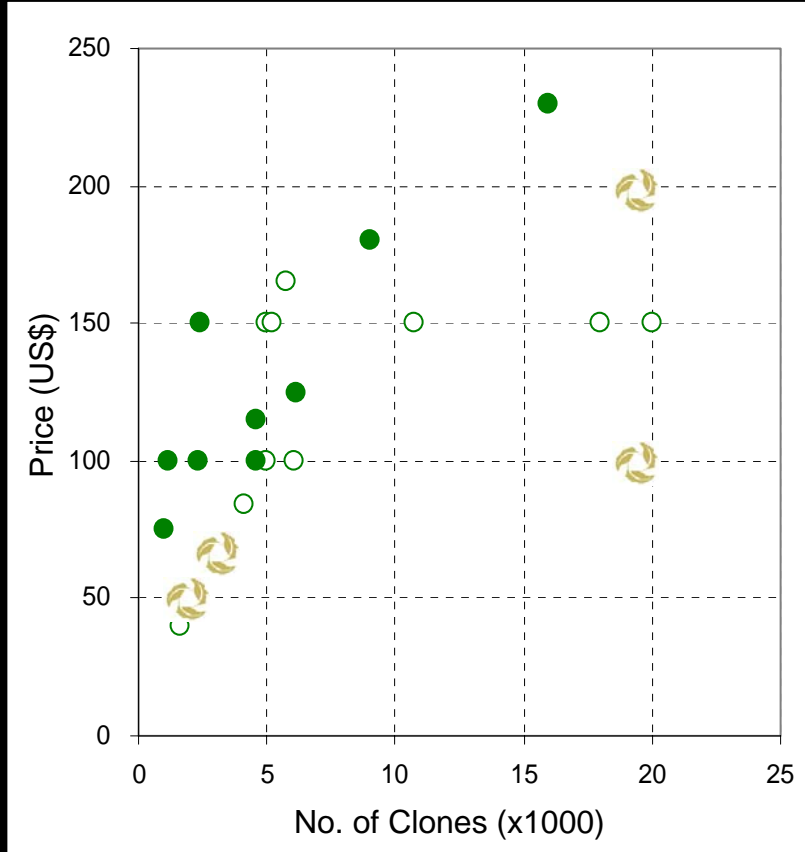


What we offer

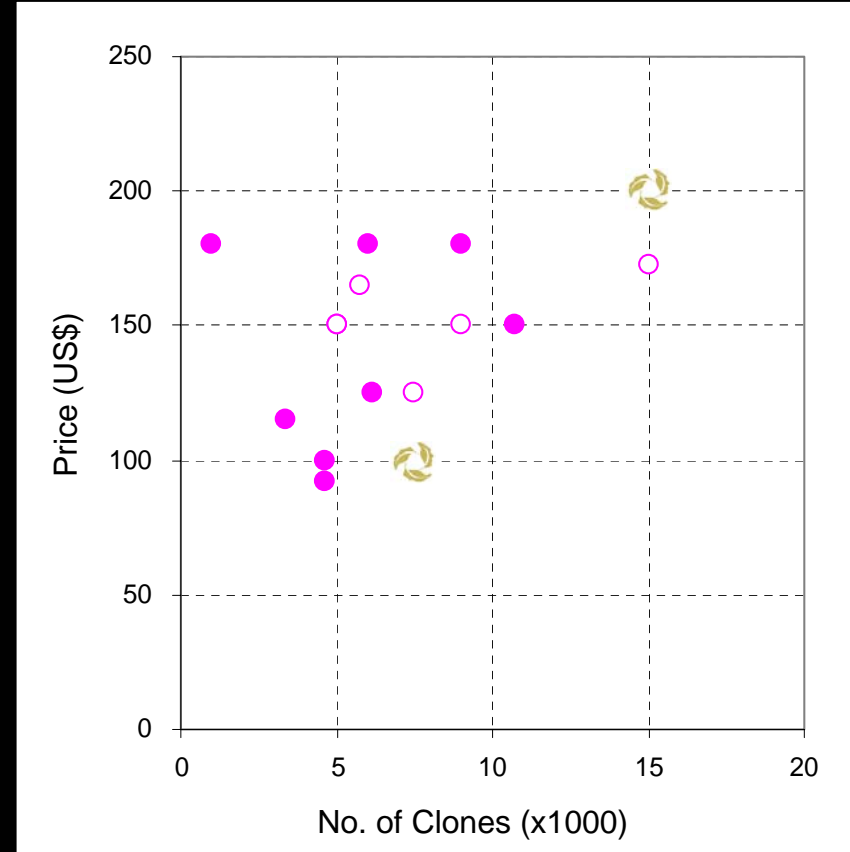


Where are we on the map?

Human arrays



Mouse arrays



Solid and hollow dots represent double and single spotting arrays respectively.

Sources from linkage.rockefeller.edu/wli/microarray/core.html

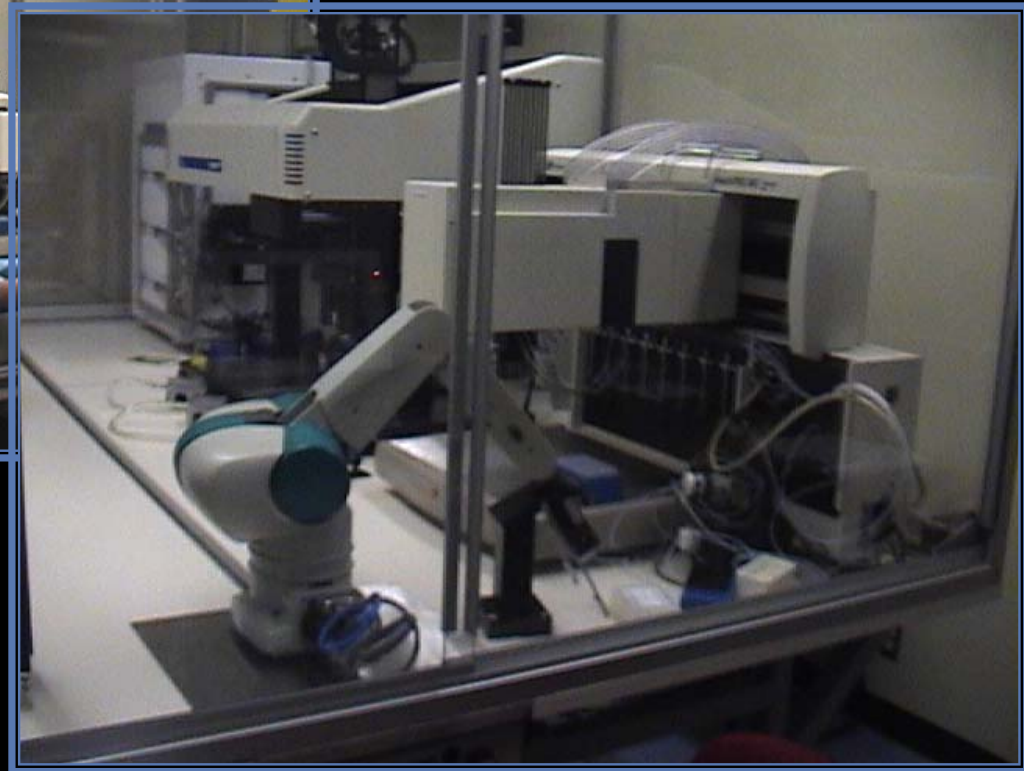
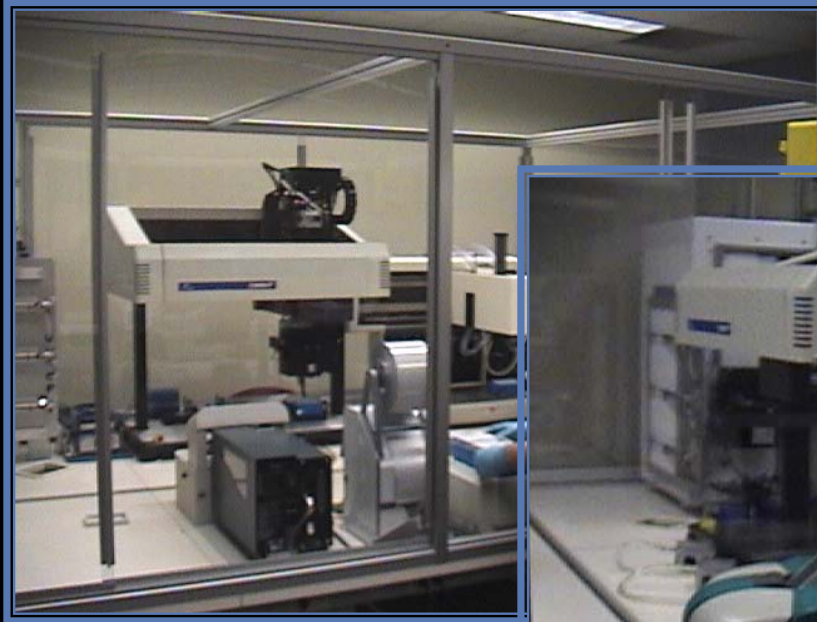


4 Q's in Production

Queries
Queue

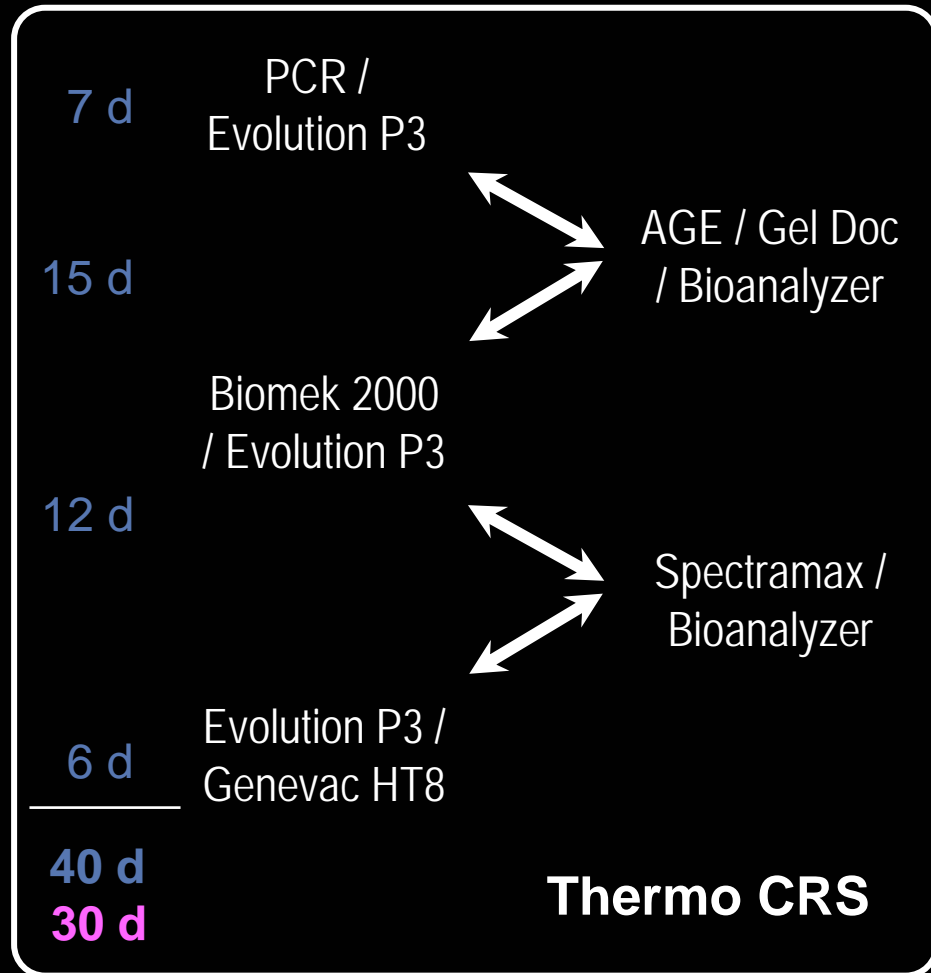
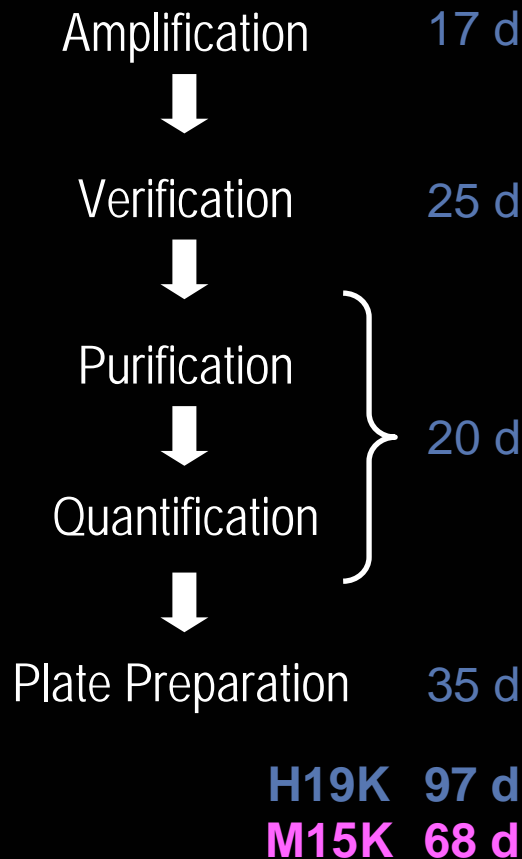


Automation



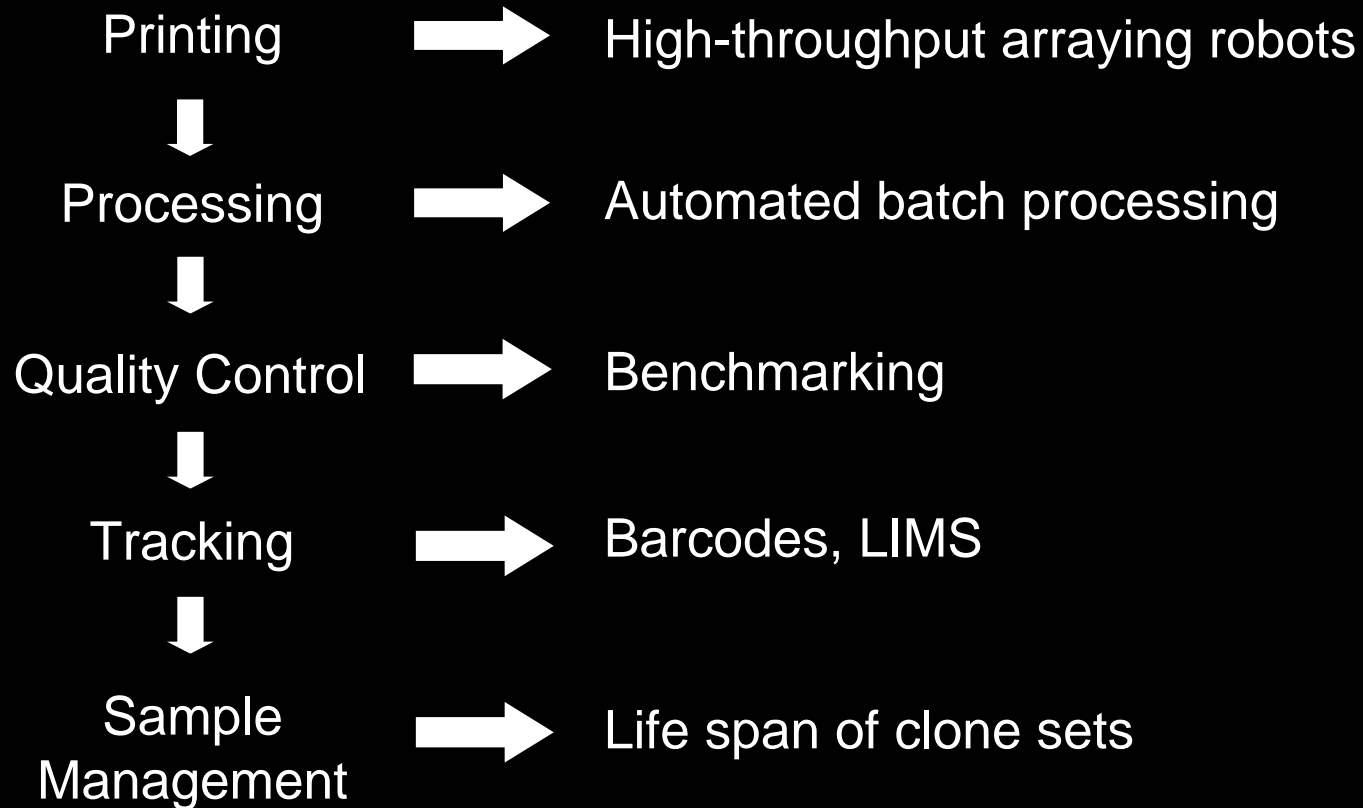
Automation

➤ Clone production and Automation



Automation

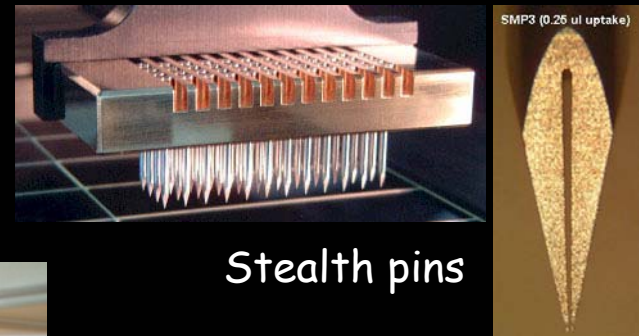
➤ Array production and Automation



High-Throughput Array Production

- No. of Arraying Robots = 6
- Simultaneous printing = 670 arrays
- Operation Time = 16 hrs/day

Arraying robot

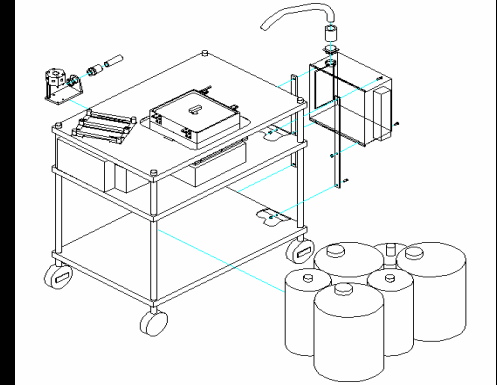
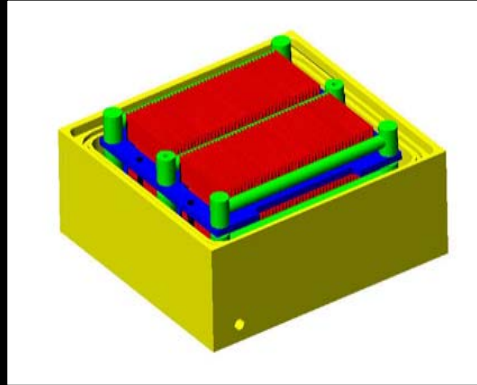
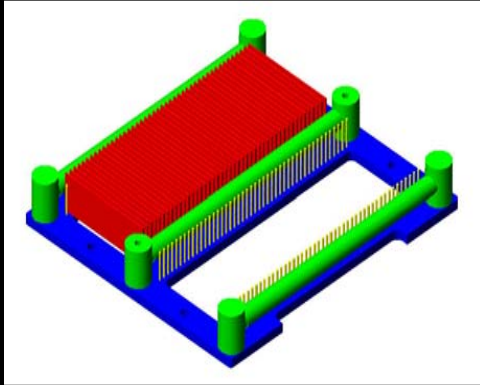


Stealth pins

Barcoded slides



Automation (Slide Processor)



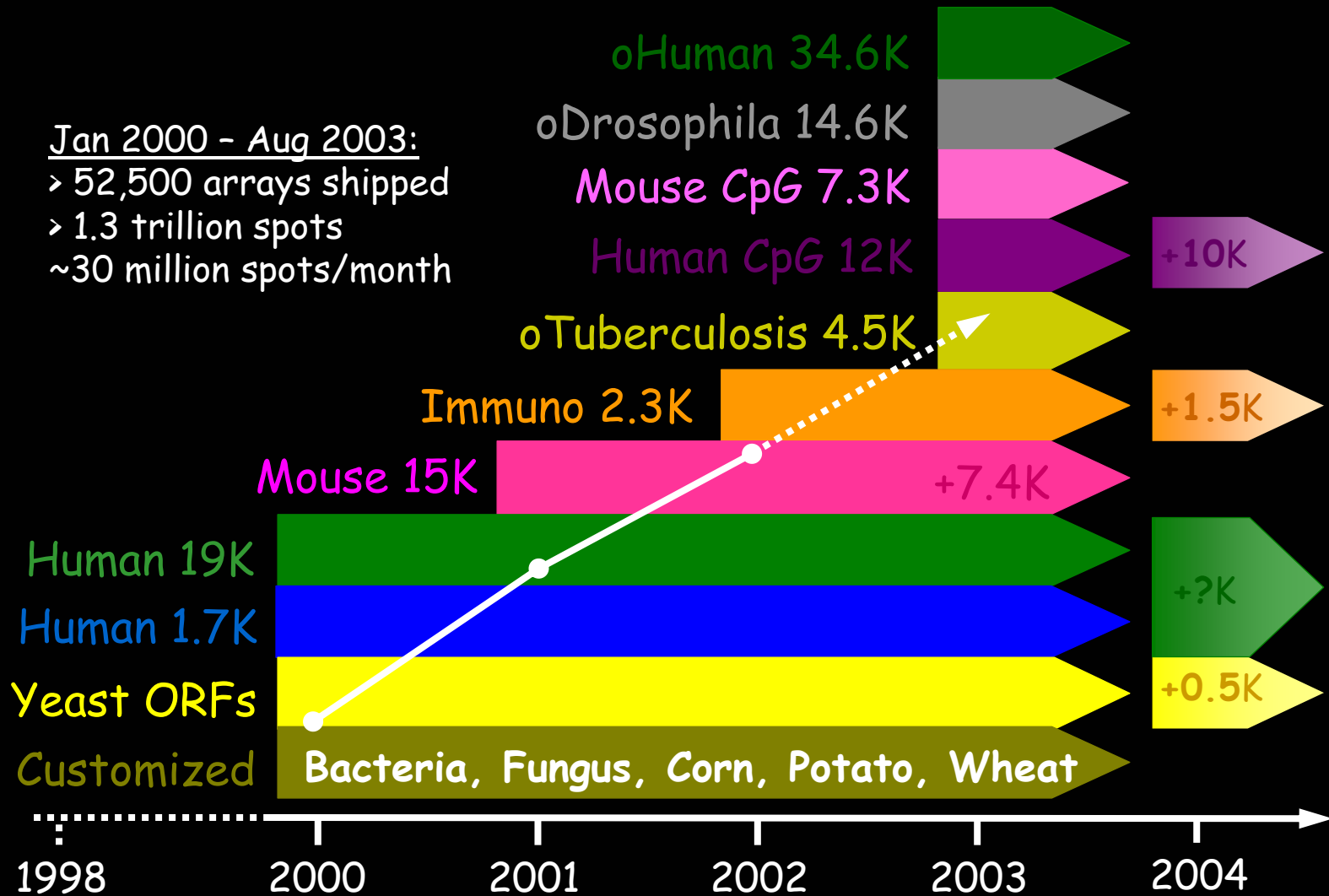
4 Q's in Production

Queries
Queue
Quantities



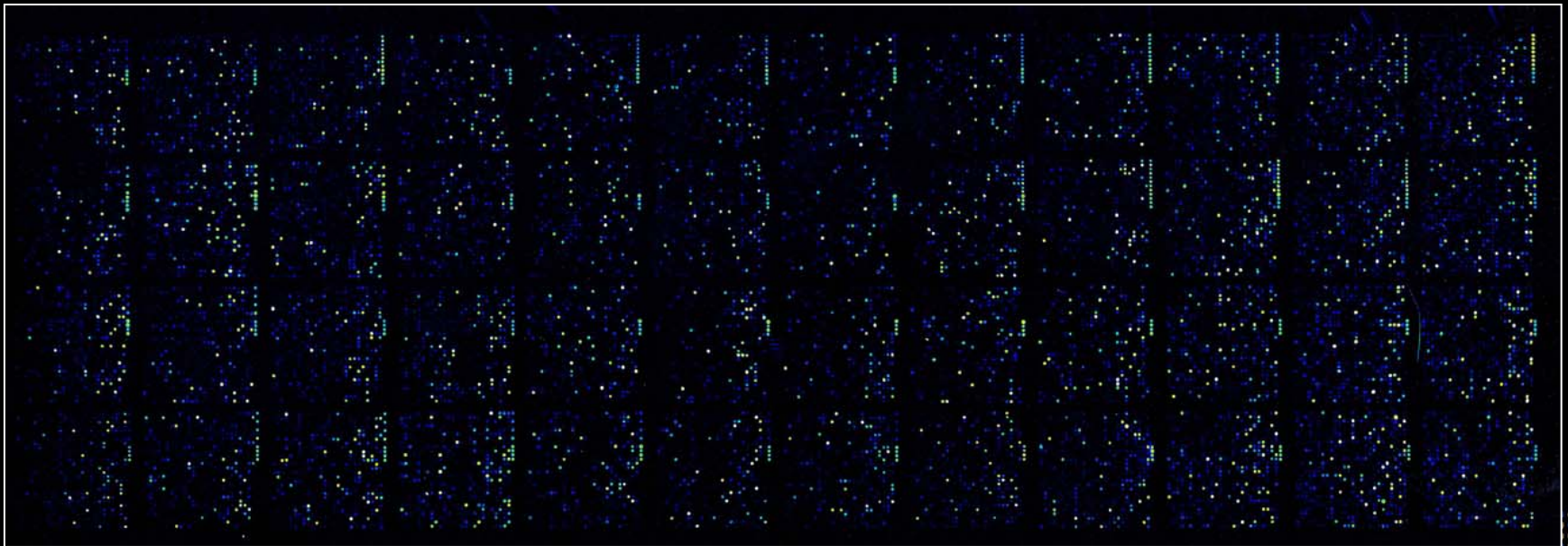
More Clone Sets ⇒ More Printing

Jan 2000 - Aug 2003:
 > 52,500 arrays shipped
 > 1.3 trillion spots
 ~30 million spots/month



More Spots \Rightarrow Higher-Density Array

- Human Genome Oligos Set: 34,580 70-mers (QIAGEN)
- Designed based on the Ensembl Human 13.31 database and Human Genome Sequencing Project
- Contains 2,664 clones present in the H19K array
- 48-grid, single-spotted array on a single slide
- Spot-to-spot distance of 150 microns
- At this density, over 40,000 spots can fit on one array



Hybridization using Universal Human Reference RNA (Stratagene).

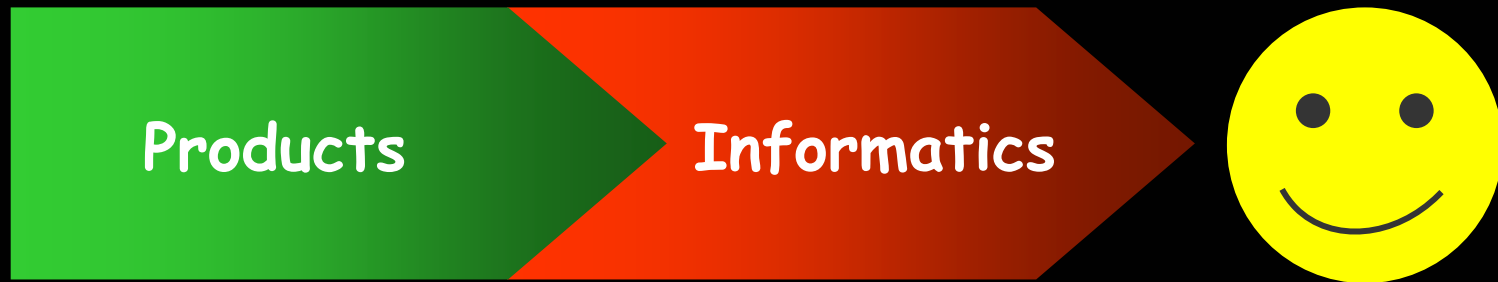


4 Q's in Production

Queries
Queue
Quantities
Qualities



A "PI" Solution

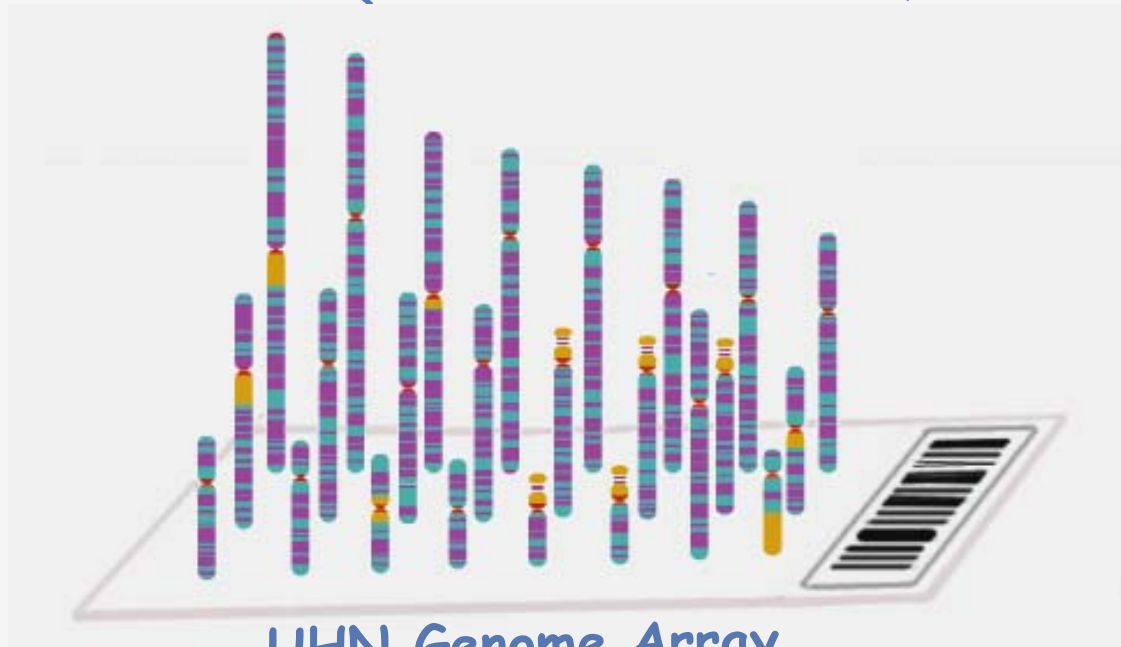


- Capacity & Efficiency
 - Size of clone sets
 - Array format
 - Production platform
- Variety
 - Universal or Theme
- Facility and Resources

- Knowledge
 - Protocols
 - Applications
 - Analytical tools
- Data Management
 - Clone sets
 - Experimental data



Coming Soon



UHN Genome Array



Acknowledgements

Production

Krista Attridge

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Stephanie Selders

Quyen Tran

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Gurbaksh Basi

Julissa Tsao

Customer Support

Susan Alexander

Informatics

Ingrid Burgetz

Zhibin Liu

Carl Virtanen

Engineering

Yasin Bismilla

Mohammad Jooyandeh

Bill Liu

Sasan Raghbizadeh

R & D Group

Eric Ho, Neil Winegarden

Dr. Jim Woodgett



THANK YOU

Queries
Quantities
Qualities

A "Products-Informatics" Solution

