2000/2001 ABRF MICROARRAY RESEARCH GROUP STUDY:

A CURRENT PROFILE OF MICROARRAY LABORATORIES

by

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INTRODUCTION

- **This is the second survey of microarray laboratories conducted by the ABRF Microarray Research Group.**
- **The first survey covered data collected from Dec. 1999 to Feb. 2000.**
- **This presentation covers data collected from Nov. 2000 to Jan. 2001.**
- **The surveys were geared to gather information from academic, pharmaceutical, and commercial laboratories that offer microarray technologies as a shared resource.**
- **Individual laboratories that have these technologies could participate.**
- **Data from manufacturers of microarray related products was not included in the survey analyses.**

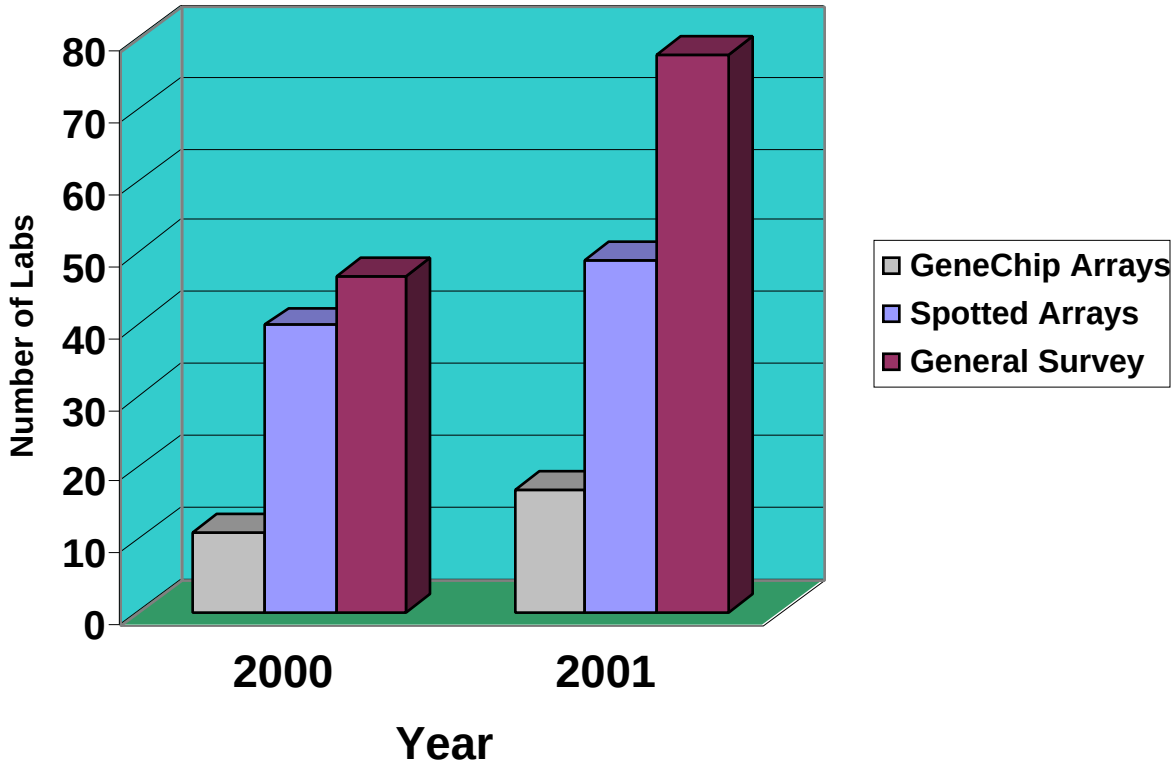

Figure 1. Participation of the ABRF Mircoarray Research Group (MARG) 2000 and 2001 surveys.

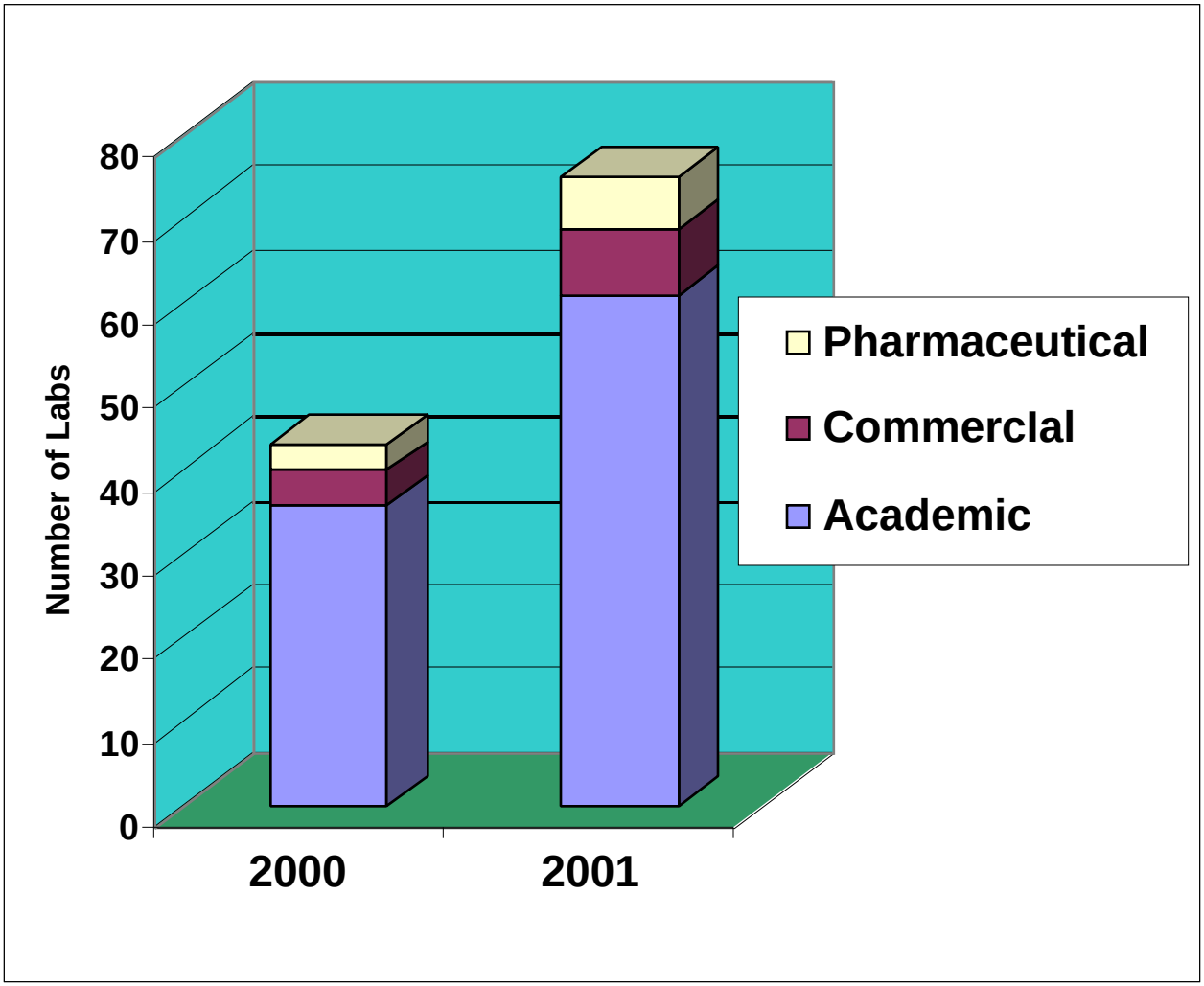

Figure 2. Type of institution of those responding to the ABRF Mircoarray Research Group (MARG) 2000 and 2001 surveys.

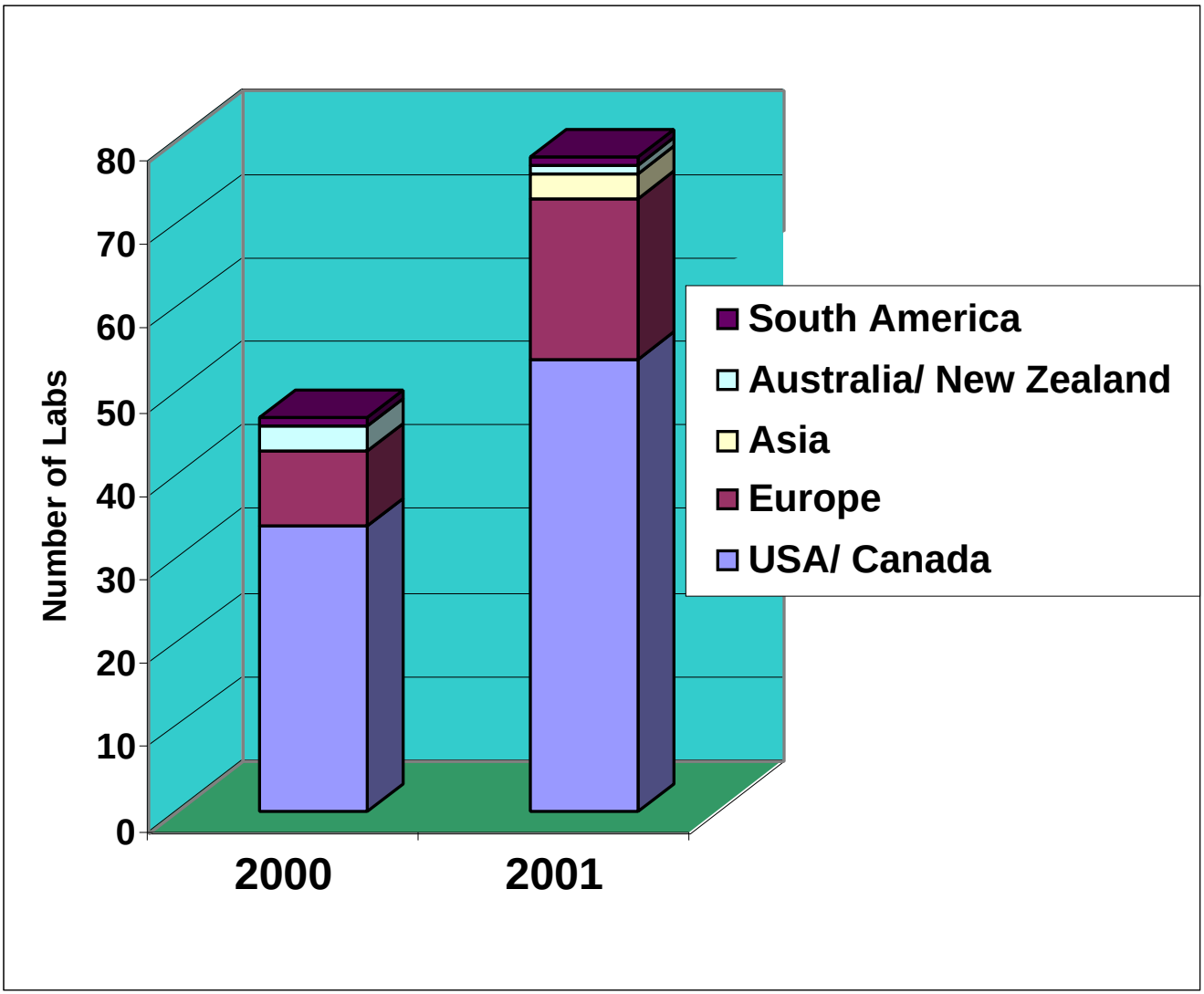

Figure 3. Geographical location of those responding to the ABRF Mircoarray Research Group (MARG) 2000 and 2001 surveys.

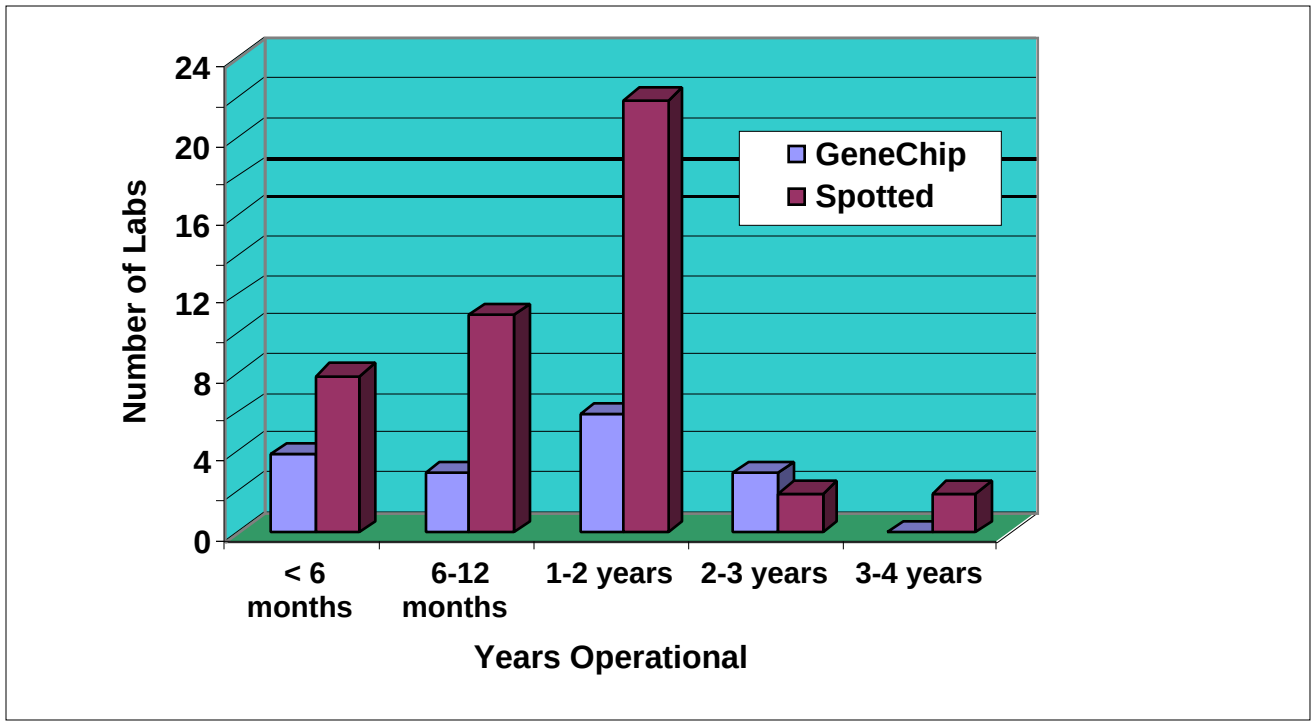

Figure 4. Length of time the respondents laboratories have been using microarrays.

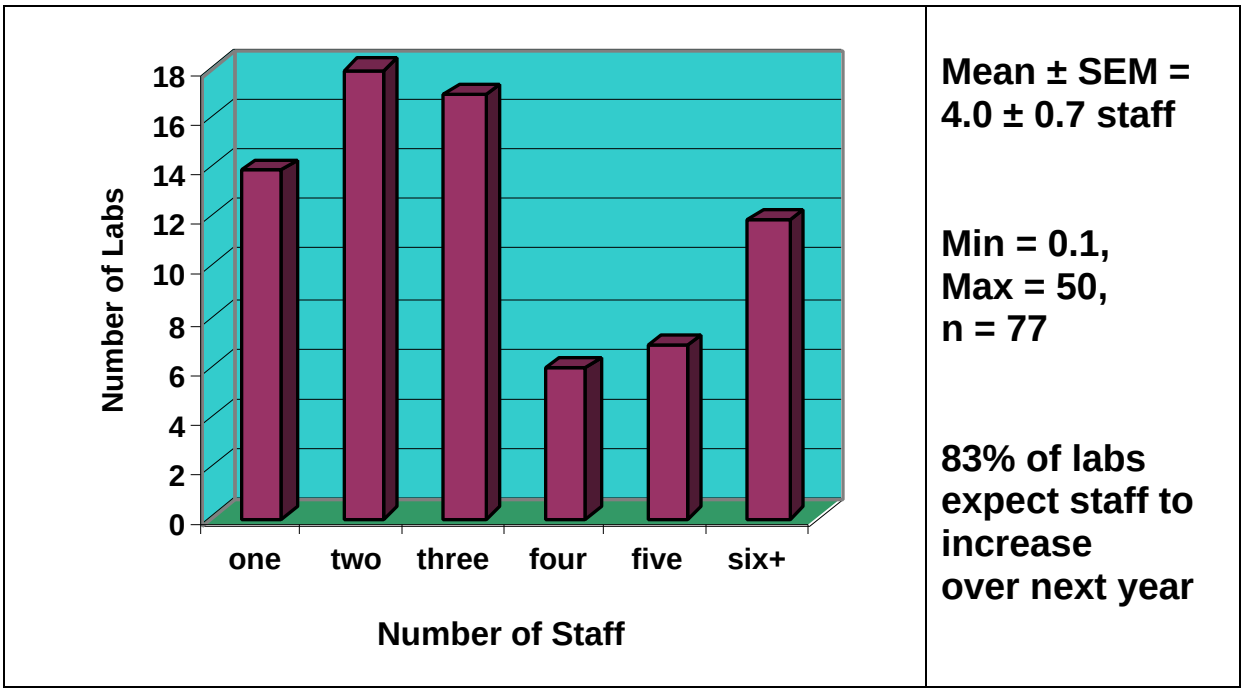

Figure 5. Number of personnel in microarray laboratories.

Average Number Of Years Of Experience In Microarray Field

Staff
Mean ± SEM = 1.46 ± 0.12 years
Min = 0 yrs
Max = 11 yrs
n = 75

Facility Director
Mean ± SEM = 2.29 ± 0.16 years
Min = 0.5 yrs
Max = 6 yrs
n = 78

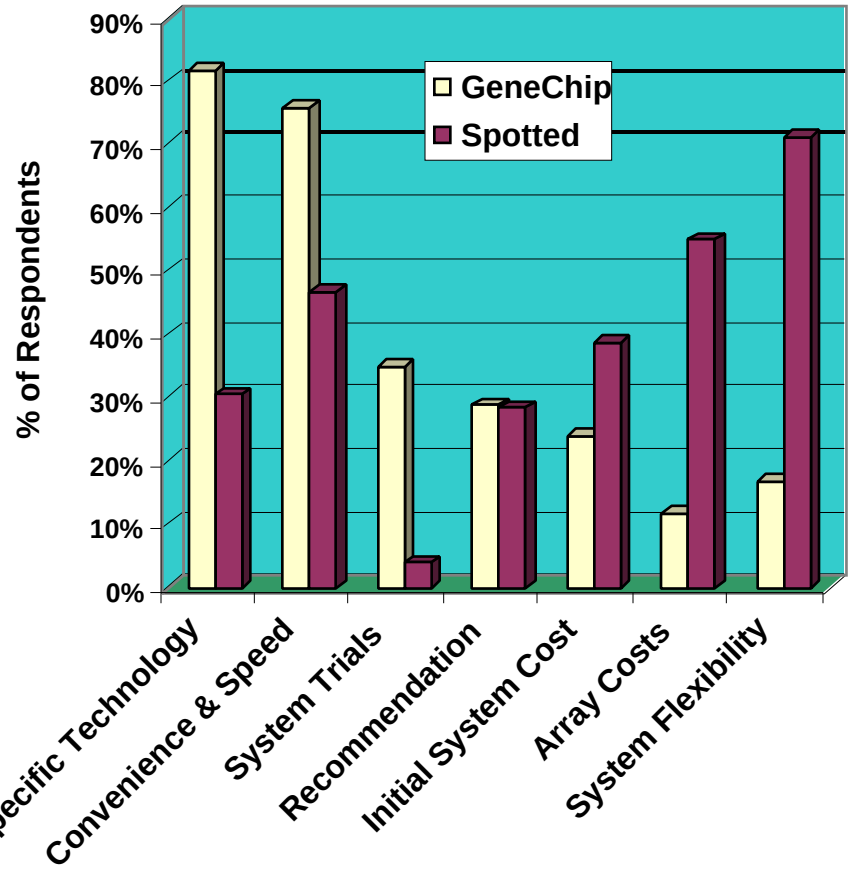

Figure 6. Factors respondents considered when selecting their microarray platform.

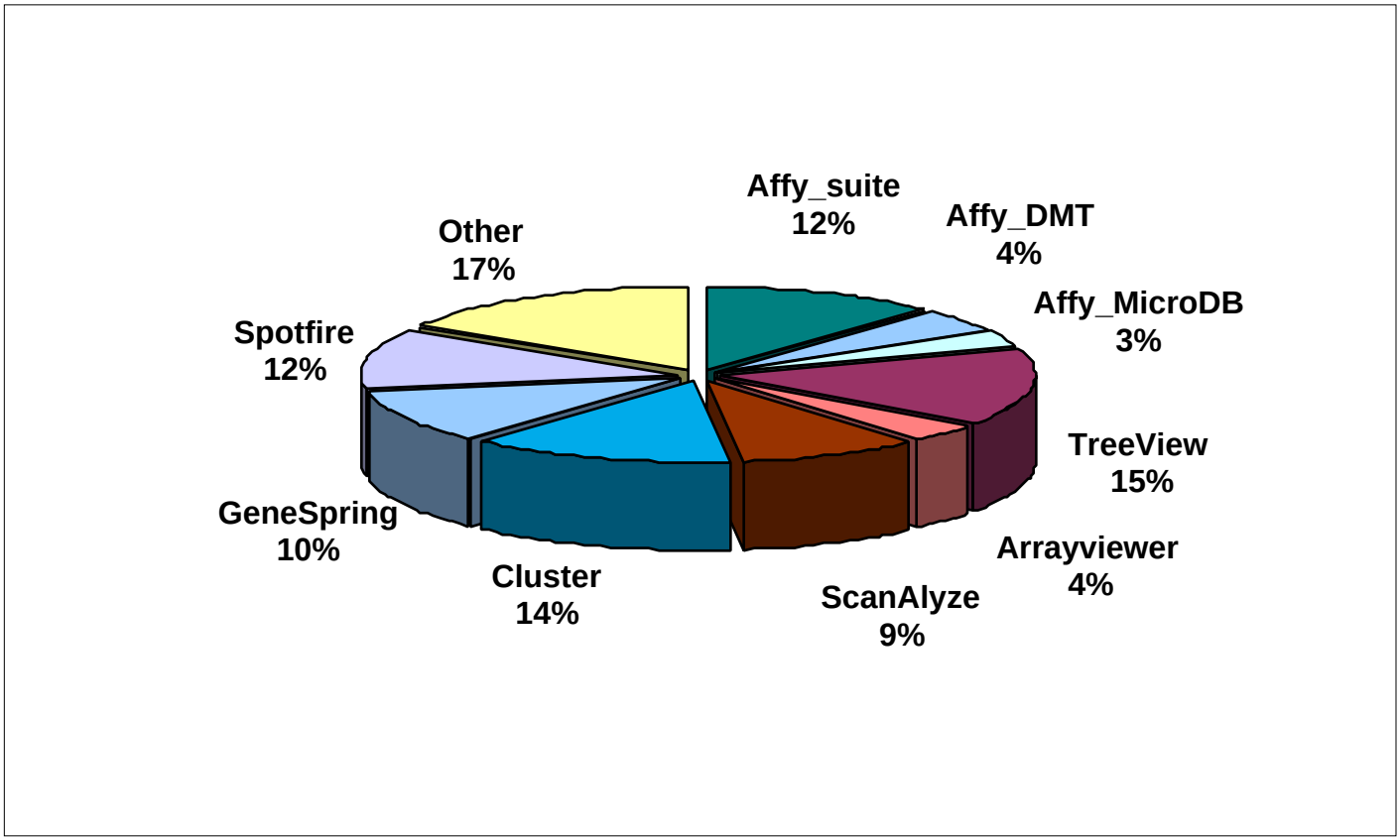

Figure 7. Microarray analysis software programs used by the respondents.

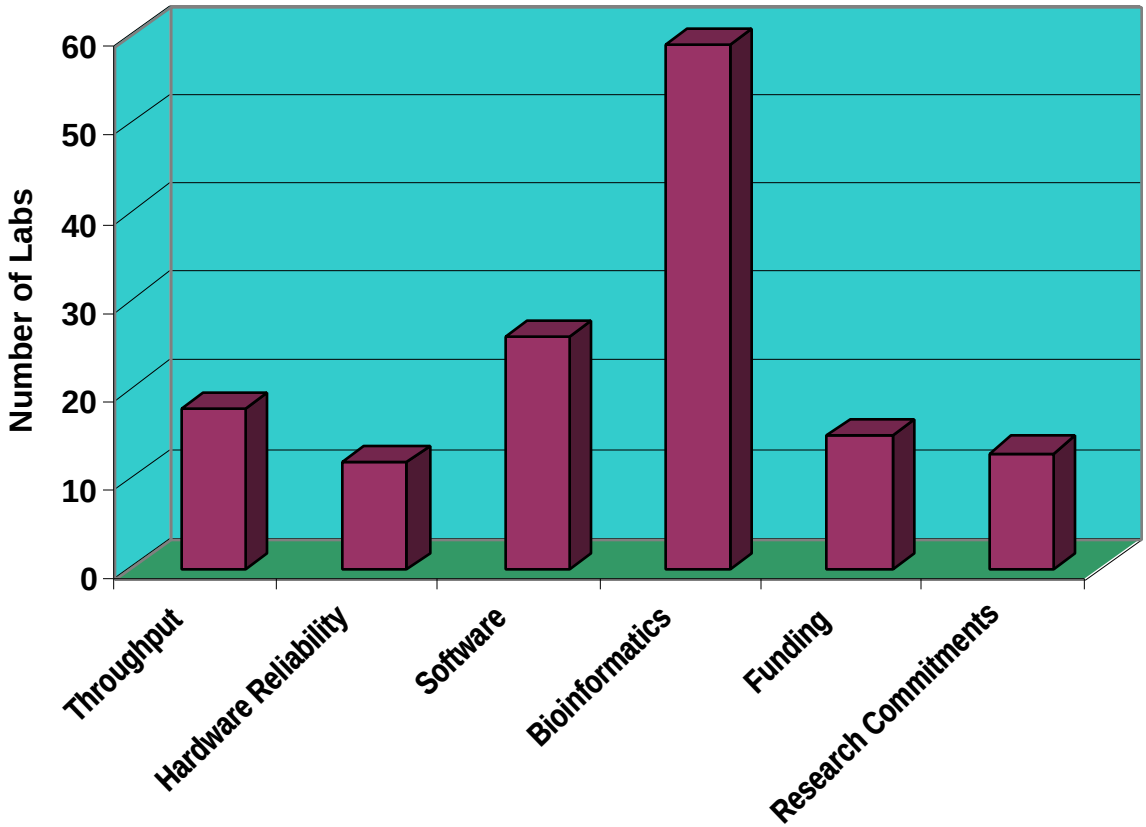

Figure 8. Areas in which microarray facilities are currently encountering challenges

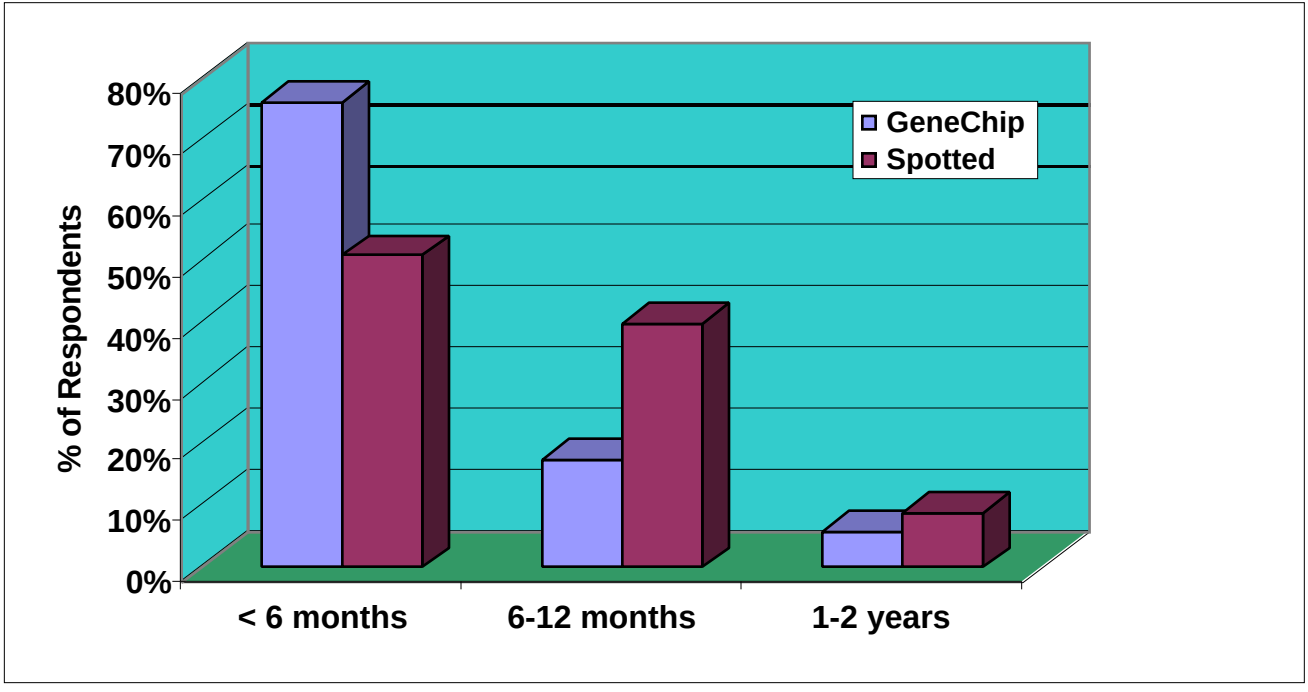

Figure 9. Time from installation to acquire satisfactory experimental data.

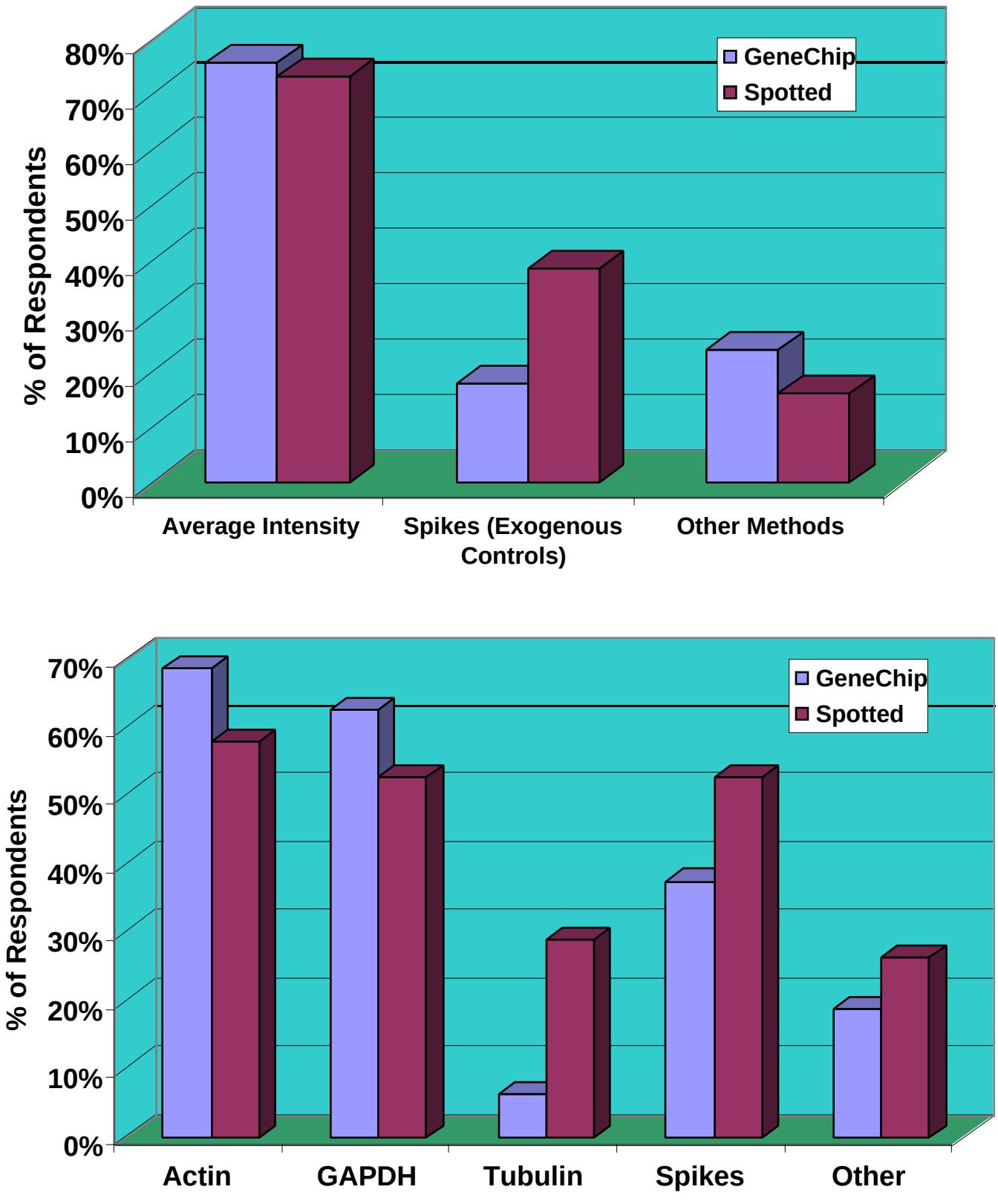

Figure 10. Approaches use to normalize (top) data and the genes used as reference standards (bottom).

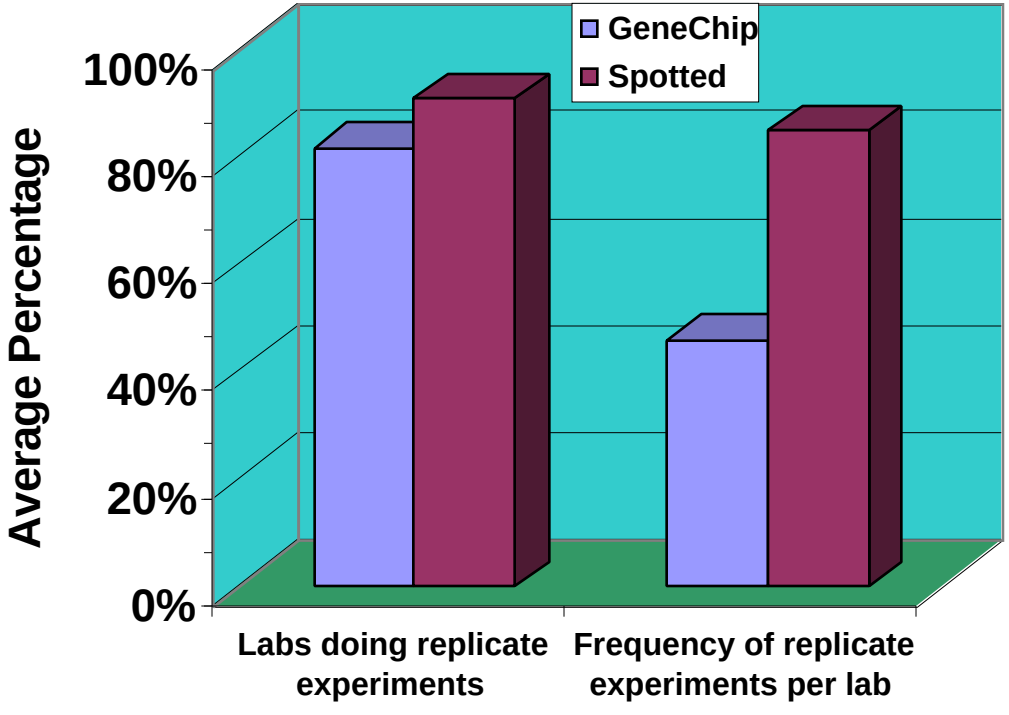

Figure 11. Frequency of laboratories using replicates in their microarray experiments.

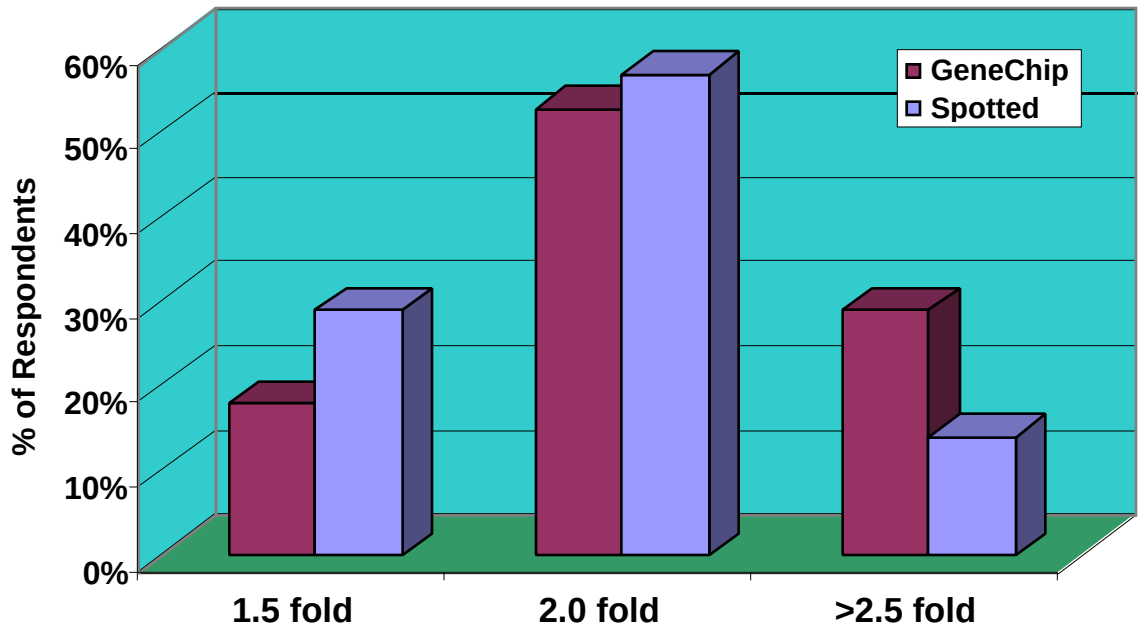

Figure 12. Perceived sensitivity of the microarray system. Smallest fold-change users believe their microarray systems can accurately discriminate.

Typical Profile of a Laboratory Using the Affymetrix GeneChip Expression System (n = 17)

- 1 Fluidics Station (68% of labs)
- 1 GeneChip Scanner (86% of labs)
- 2 Computer Workstations (54% of labs)
- Routinely use Test arrays (71% of labs)
- Throughput = 350 ± 500 chips/year (mean ± SD)
- Satisfactory data in <6 months from system installation (76% of labs)

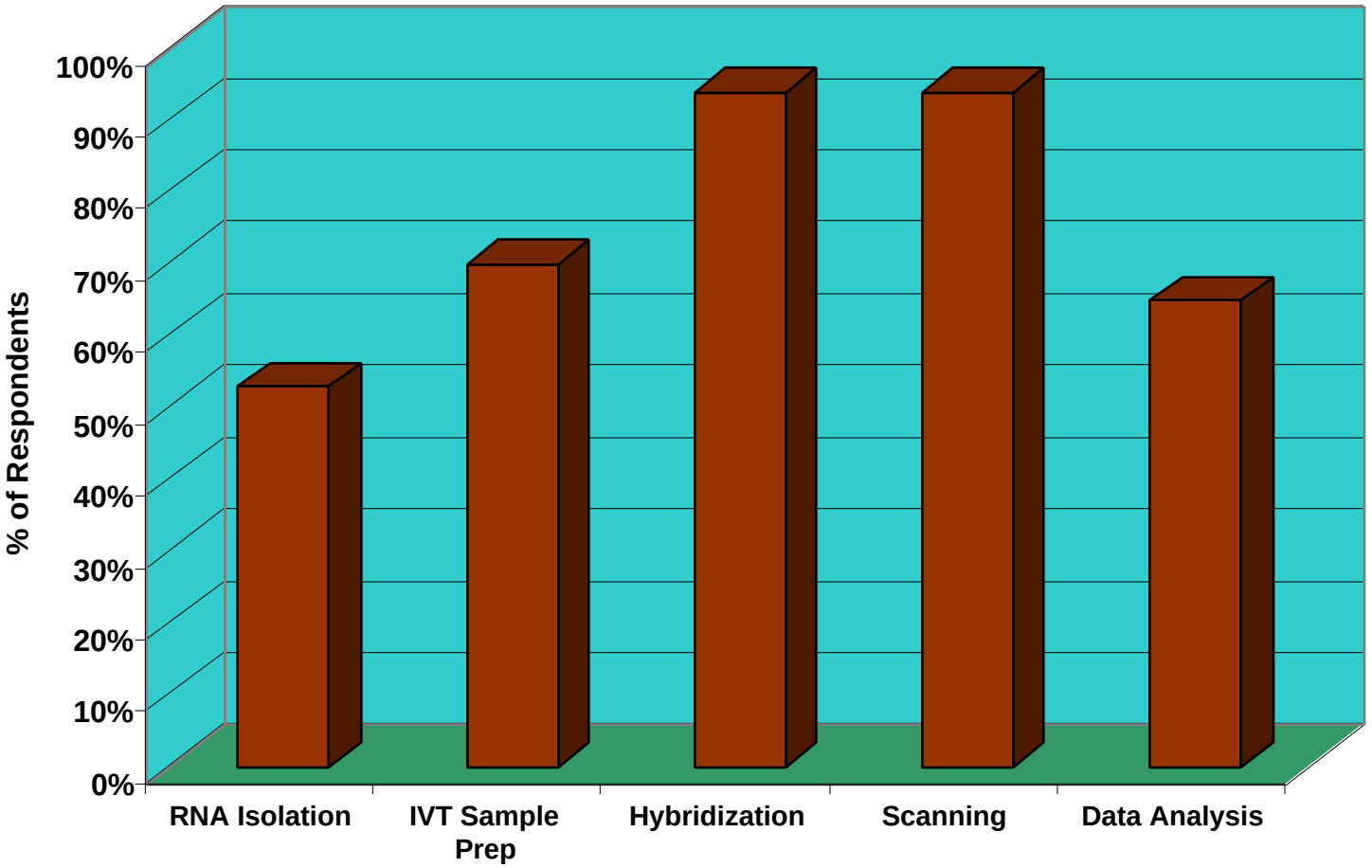

Figure 13. Services offered by laboratories using the Affymetrix GeneChip Expression System.

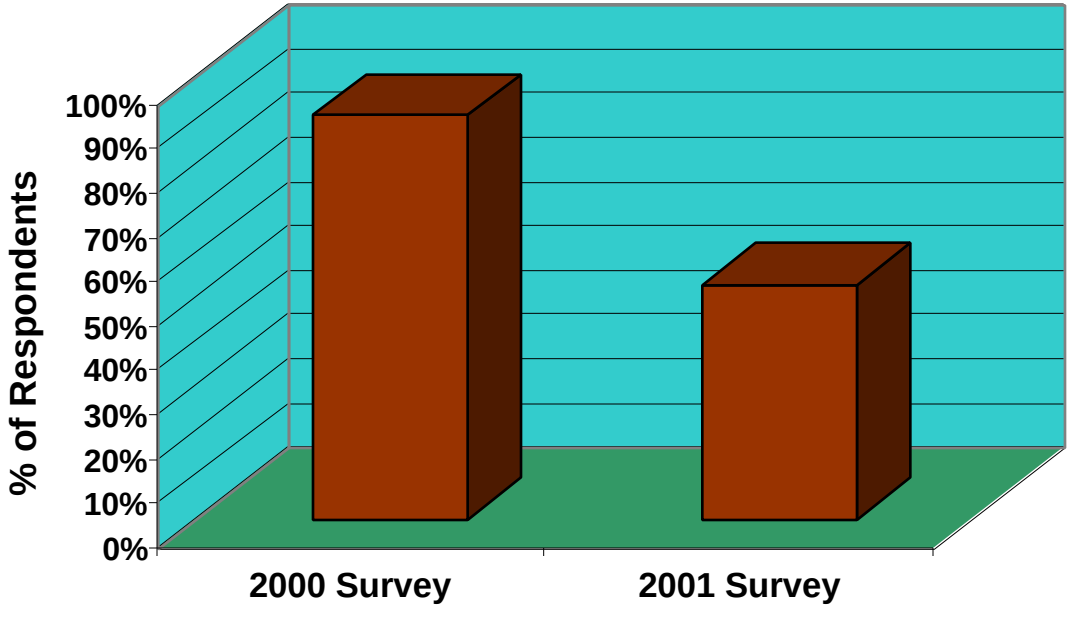

Figure 14. Percentage of respondents indicating that they usually Test arrays (Test1 or Test2) in their experiments.

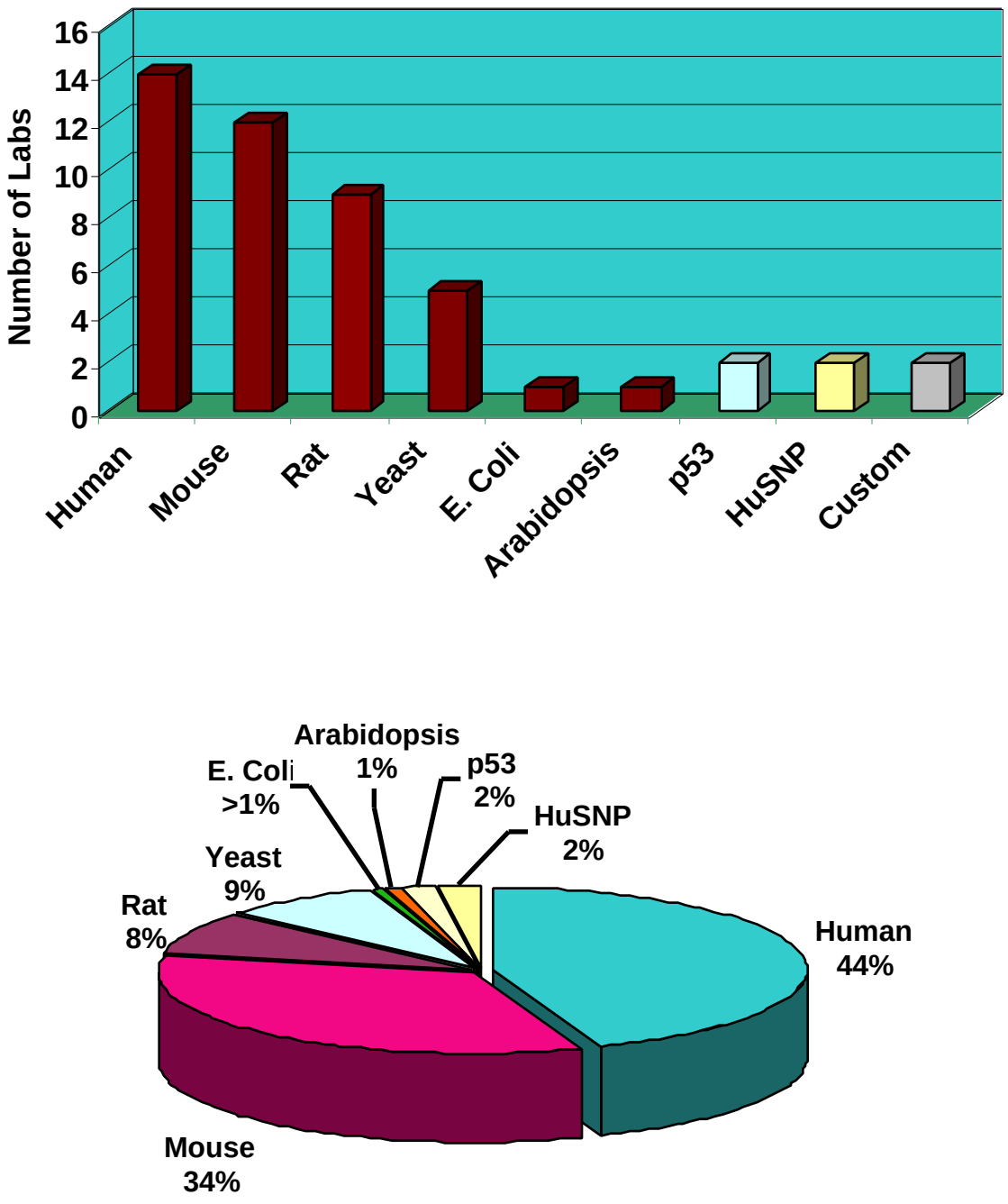

Figure 15. Types GeneChip arrays used by the responding laboratories (top,n = 17) and the percentage of use of each (bottom, n = 2056).

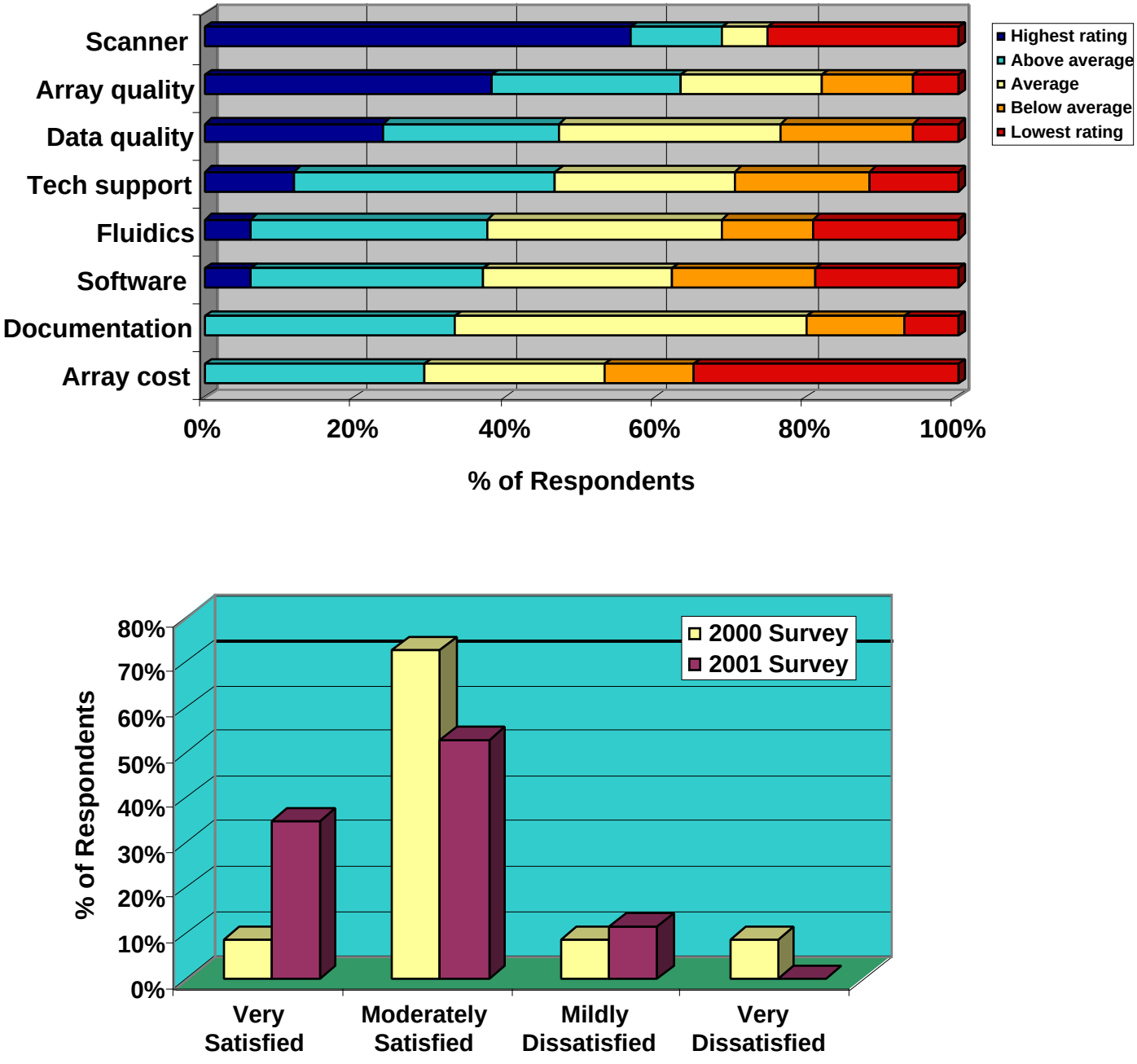

Figure 16. User evaluation of the Affymetrix GeneChip System by component (top) and overall satisfaction (bottom).

Conclusions from the Affymetrix GeneChip Section of the Survey

- **Implementation of GeneChip technology into facility laboratories began about two years ago.**
- **The majority of laboratories are moderately satisfied with the overall performance of their GeneChip systems.**
- **The GeneChip system configuration currently used in most laboratories consists of one fluidics workstation, one confocal laser scanner and two computers.**
- **Most Affymetrix gene expression studies are currently performed with murine and human GeneChip arrays.**

Profile of a Custom Microarray Facility

- **Utilizes an arrayer, scanner and dedicated computing equipment.**
- **Charges per array.**
- **Produces 117 arrays per month (range = 1 - 800).**
- **Provides arrays for 6 research groups (range = 1 - 35).**
- **Use fluorescently labelled target DNA (94% of labs).**
- **Use cy3 and cy5 as the fluorescent label.**
- **Use poly L-lysine and 3-aminopropyltriethoxysilane coated slides.**
- **Use protocols other than manufacturers recommendations.**

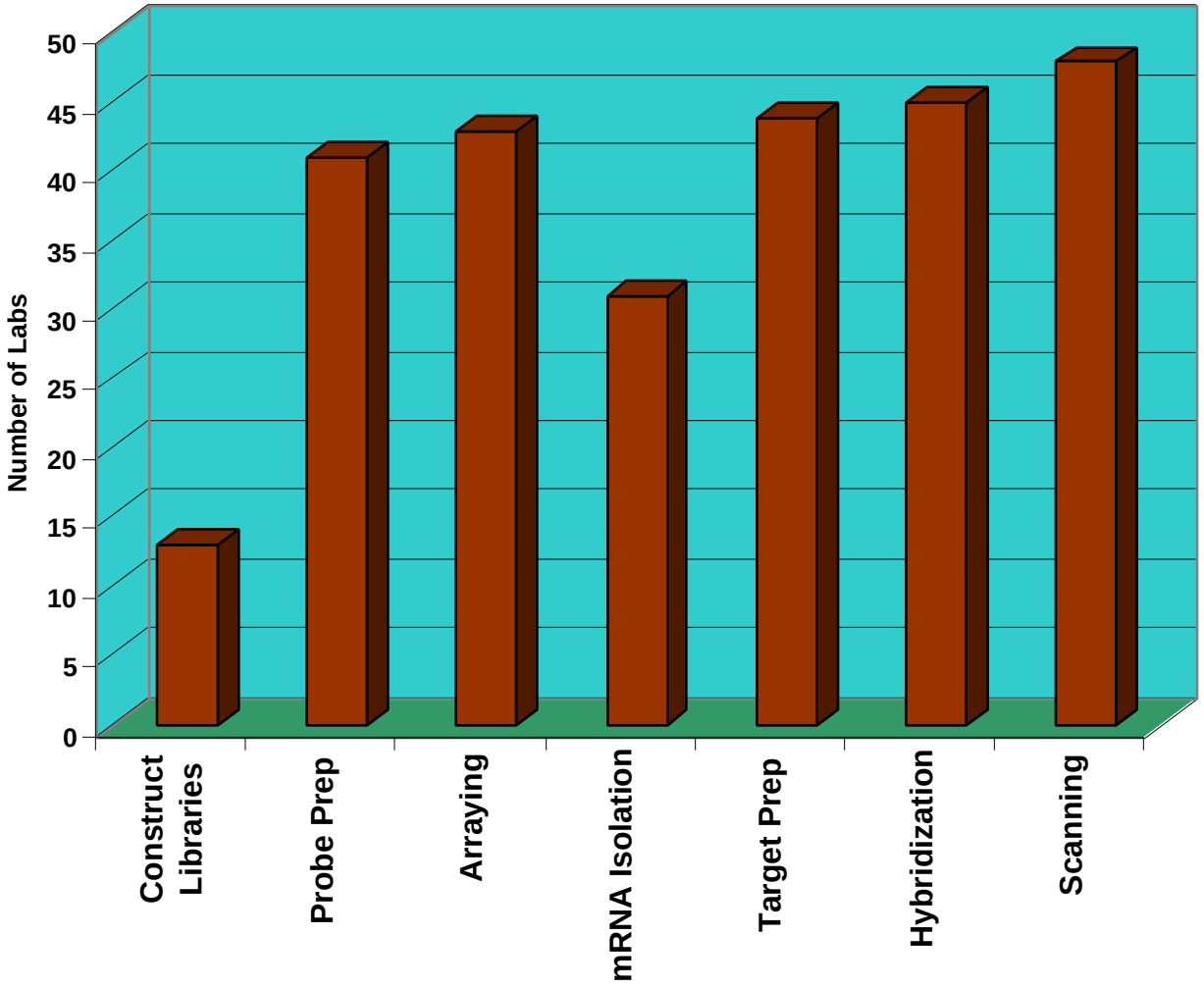

Figure 17. Types of services offered by a custom microarray facility (n = 49 labs).

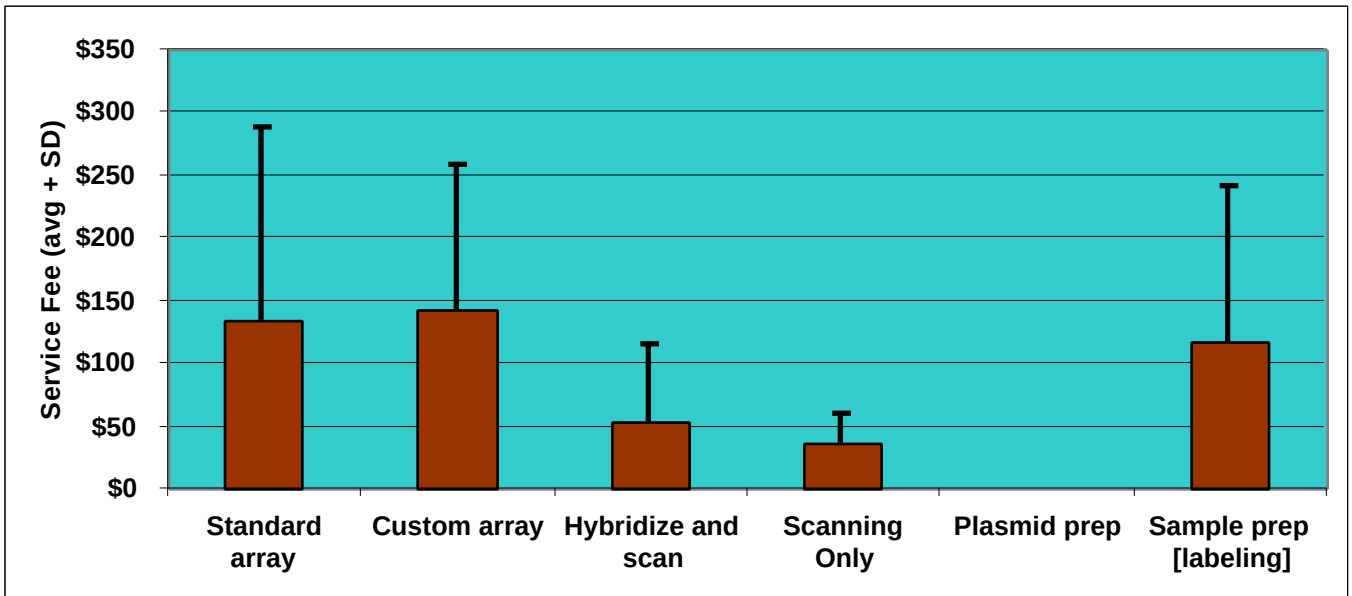

Figure 18. Fees for services offered by a custom microarray facility.

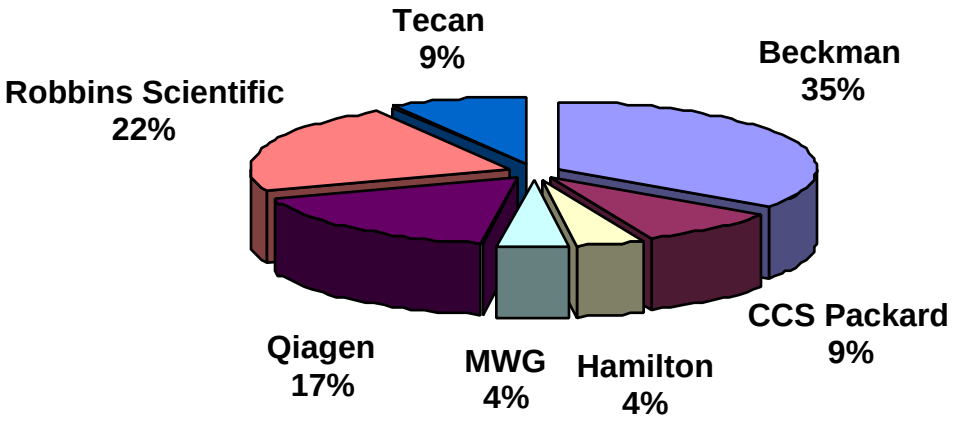

Figure 19. Liquid handling systems used by custom microarray facilities (n = 29).

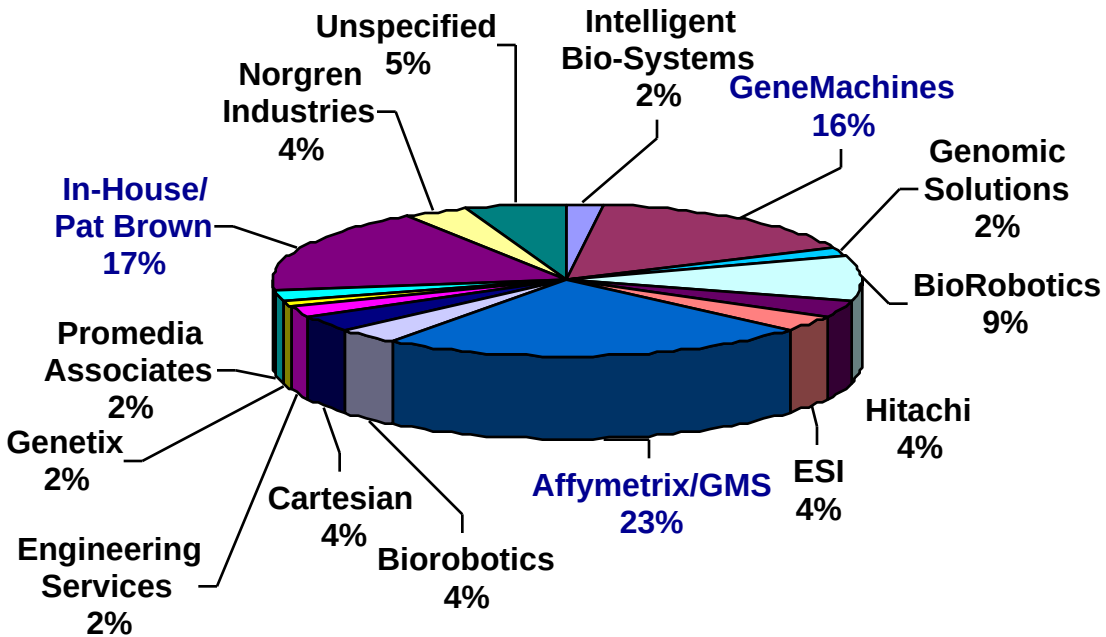

Figure 20. Brands of slide arraying instruments used by custom microarray facilities (n = 55). The most widely used printers are shown in blue.

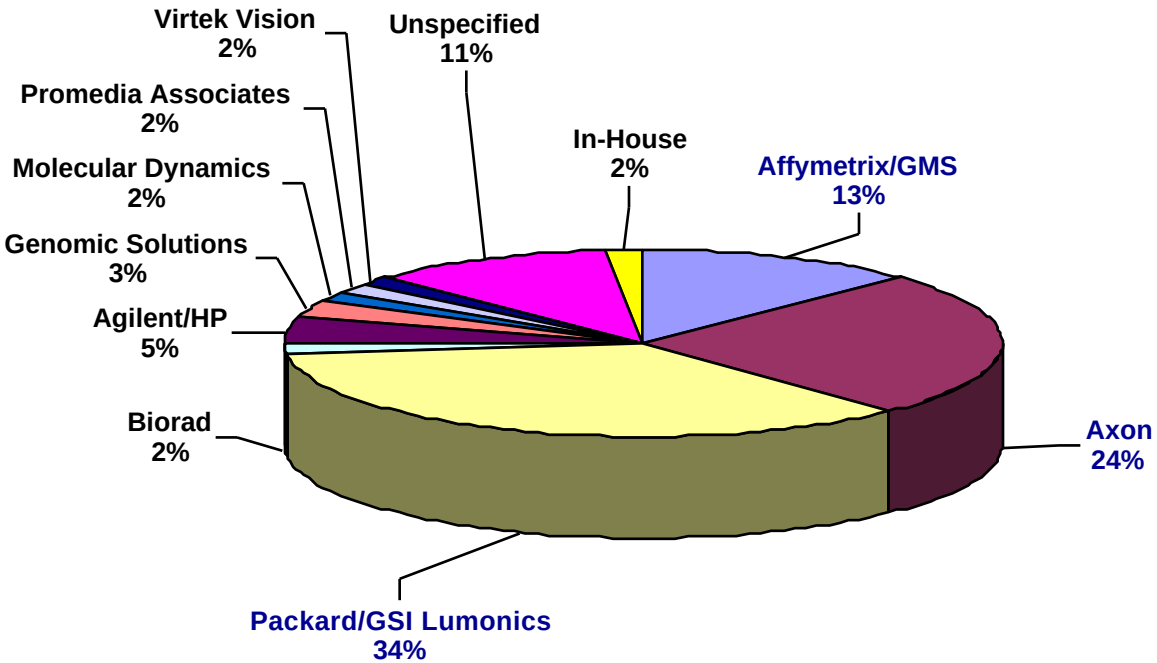

Figure 21. Brands of scanners used by custom microarray facilities (n = 63). The more widely purchased scanners are shown in blue.

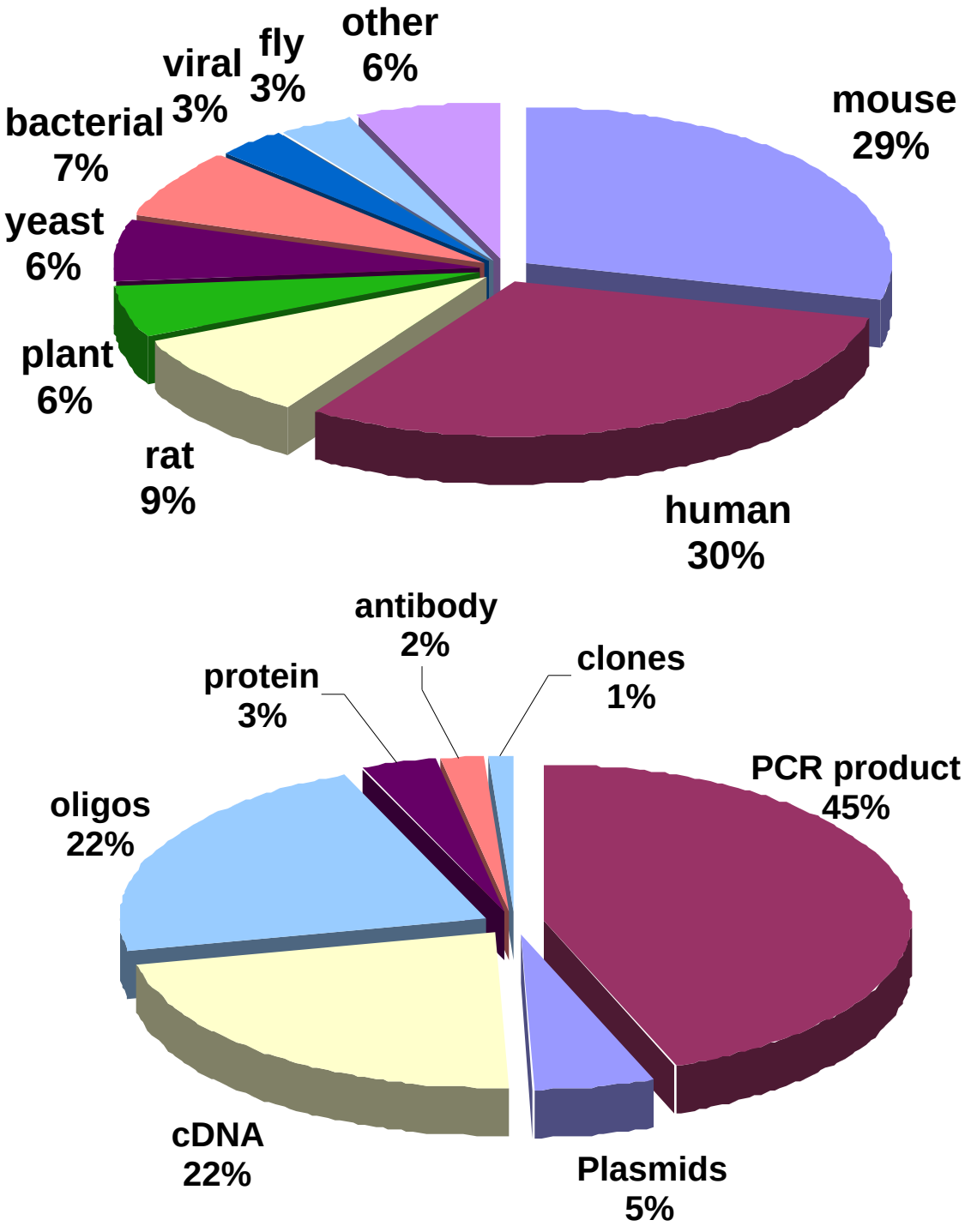

Figure 22. Source (top) and substrate type (bottom) of material spotted by microarray facilities.

Table 1. Microarray facility costs. Costs to prepare cDNA and oligonucleotide substrates, acquire instrumentation and reagents[1], and label targets[2].

cDNA

Characteristic	Average ± SD	Maximum	Minimum
Length of cDNAs spotted on array	1039 ± 421 bases	4000 bases	50 bases
Density of features per slide	7154 ± 5107	18.500	9
Size of features	150 ± 50 μm	250 μm	50 μm
Distance between features	219 ± 104 μm	550 μm	75 μm
Cost per feature	$0.86 ± $1.33	$2.66	$0.003

Oligos

Characteristic	Average ± SD	Maximum	Minimum
Length of oligos spotted on array	37 ± 20 bases	70 bases	14 bases
Density of features per slide	4350 ± 3865	25,000	10
Size of features	134 ± 49 μm	250 μm	90 μm
Distance between features	256 ± 77 μm	500 μm	150 μm
Cost per feature	$2.64 ± $5.25	N/A	N/A

[1]Facility set up = $286,000 ± $162,000 (range = $20K - $700K)

[2]Preparation of labeled target material = $82 ± $20 per target (range = $0.50 - $300)

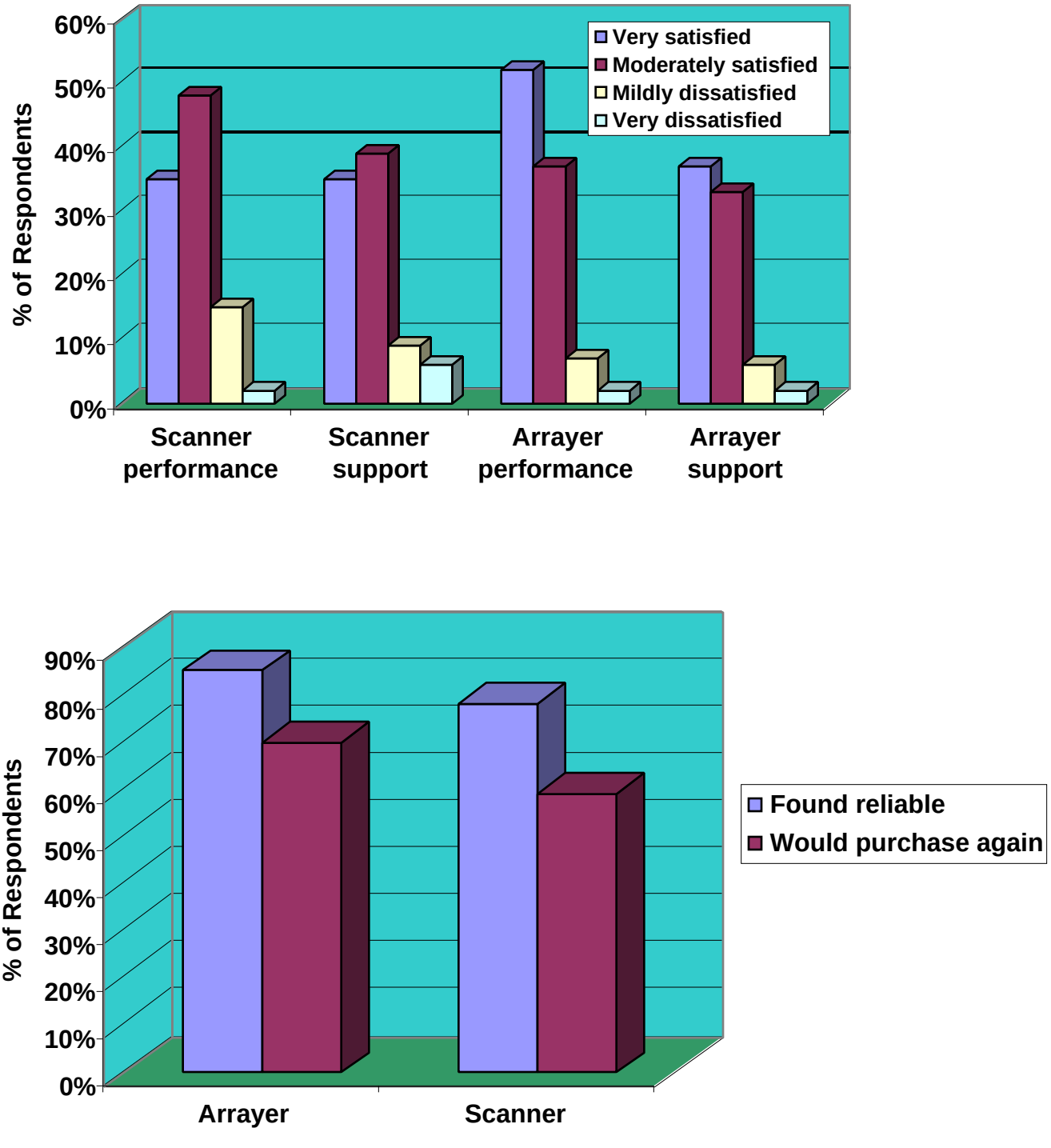

Figure 23. User satisfaction (top) with and reliability (bottom) of their custom microarray instrumentation. *Note: These data were not broken down by manufacturer.*

Summary of the Custom Microarray Section of the Survey

- **The cDNA arrayers use a wide range of instrumentation from different manufacturers.**
- **All have a similar slide format derived from Pat Brown's concept.**
- **The predominance of some cDNA microarray related companies may be correlated to the length of time they have been in the market.**

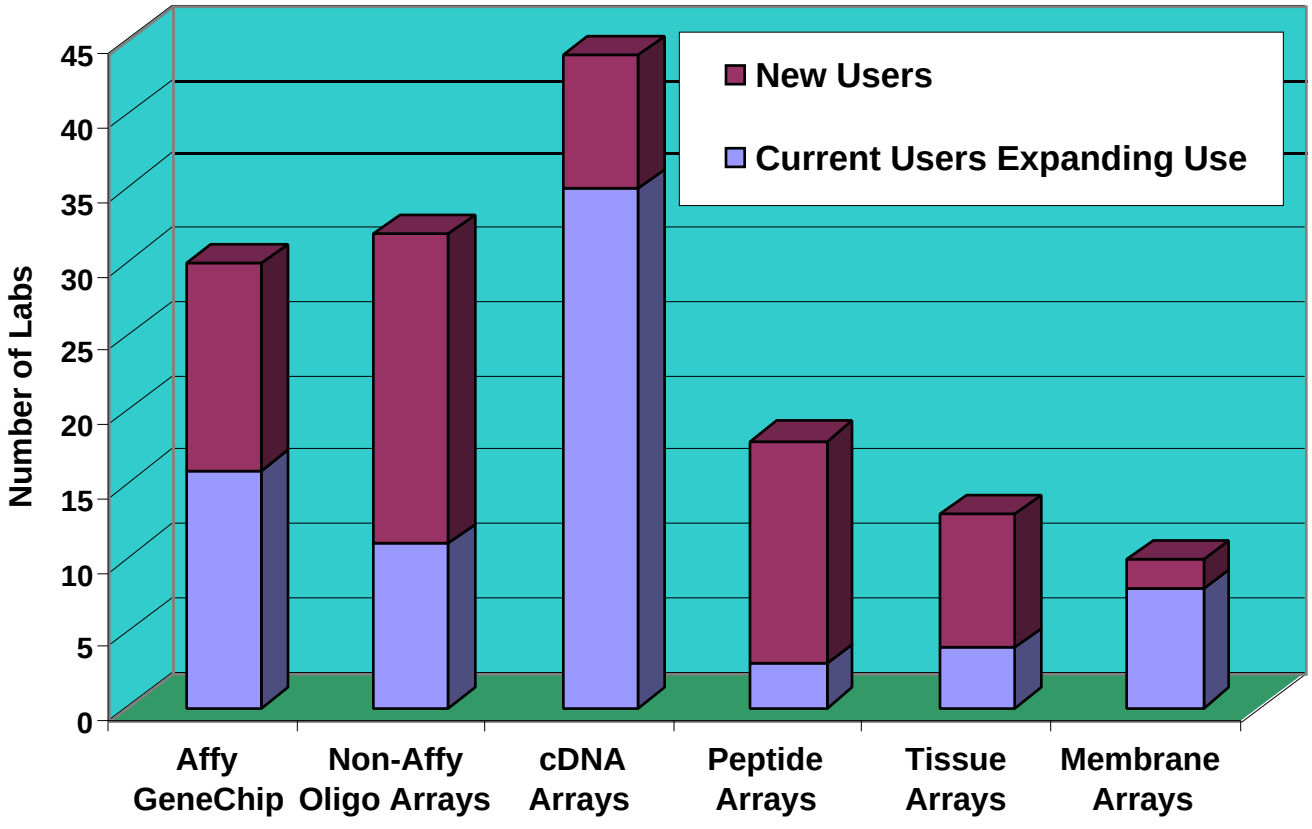

Figure 24. Future directions of microarray laboratories. Most (83%) microarray laboratories plan to expand both staff and instrumentation, and both custom arrayer and Affymetrix users indicate a trend to create shared resource laboratories in which these technologies coexist and complement each other.