



Laboratory Software: Managing Discovery Data

Executive Summary

Introduction

Twenty years ago researchers in the life sciences seldom, if ever, used a computer for more than simple word processing. Today, computers, and the software programs they run, are routinely used by scientists as they seek to answer increasingly complex questions. As the tools and technologies to address these questions have developed, so too have the software programs to go with them. Complex experiments such as microarray analysis and high content screening (HCS) could not be performed, much less analyzed, without the appropriate software applications. Developments in technology have also led to changes in the everyday workings of the laboratory. Even small labs are capable of generating large volumes of data and, thus, need a system for accurately recording, managing and analyzing it. As a result, more labs are using software programs for general laboratory management, such as laboratory information management systems (LIMS) and electronic laboratory notebooks. And as the popularity of laboratory automation grows, so has the need for the software programs to go with it.

One of the best examples of the interdependence between advances in research and software can be seen in the completion of the Human Genome Project (or any one of the subsequent genome projects). As scientists were able to sequence DNA faster, an efficient method to analyze the data was needed. And hence, the software which fulfilled this need has become as significant a contributor to the successful completion of the project as the sequencing technology itself. As Rob Scheschareg, vice president of sales, marketing and product development at the technology media company IDG, puts it “[Information Technology] is becoming the enabling component for the next level of advances in research.”¹

In the not-too-distant future, scientists will no longer have a choice as to whether or not they use software in their research, the choice will be which software application to use. According to Shawn Green, CEO and founder of LabBook Inc., “High-performance computing must go hand in hand with an easy-to-use, interactive interface to mine and transform disparate data into information that can be accessed, visualized and shared or integrated with other types of data in a meaningful fashion.”² While the features of any particular software program are undoubtedly important, first we must ask which types of software researchers are looking for. With software applications available for nearly every aspect of life science research, this is not a trivial task. This survey will help suppliers better understand the choices researchers are likely to make with regard to both the features and applications of available software. In addition to looking toward decision-making criteria for future purchases, this survey also addresses current patterns of use in the laboratory software market.

Methodology

The 2004 Laboratory Software Survey was administered on-line between December 13th and 17th, 2004. The survey was completed by 1045 life scientists.

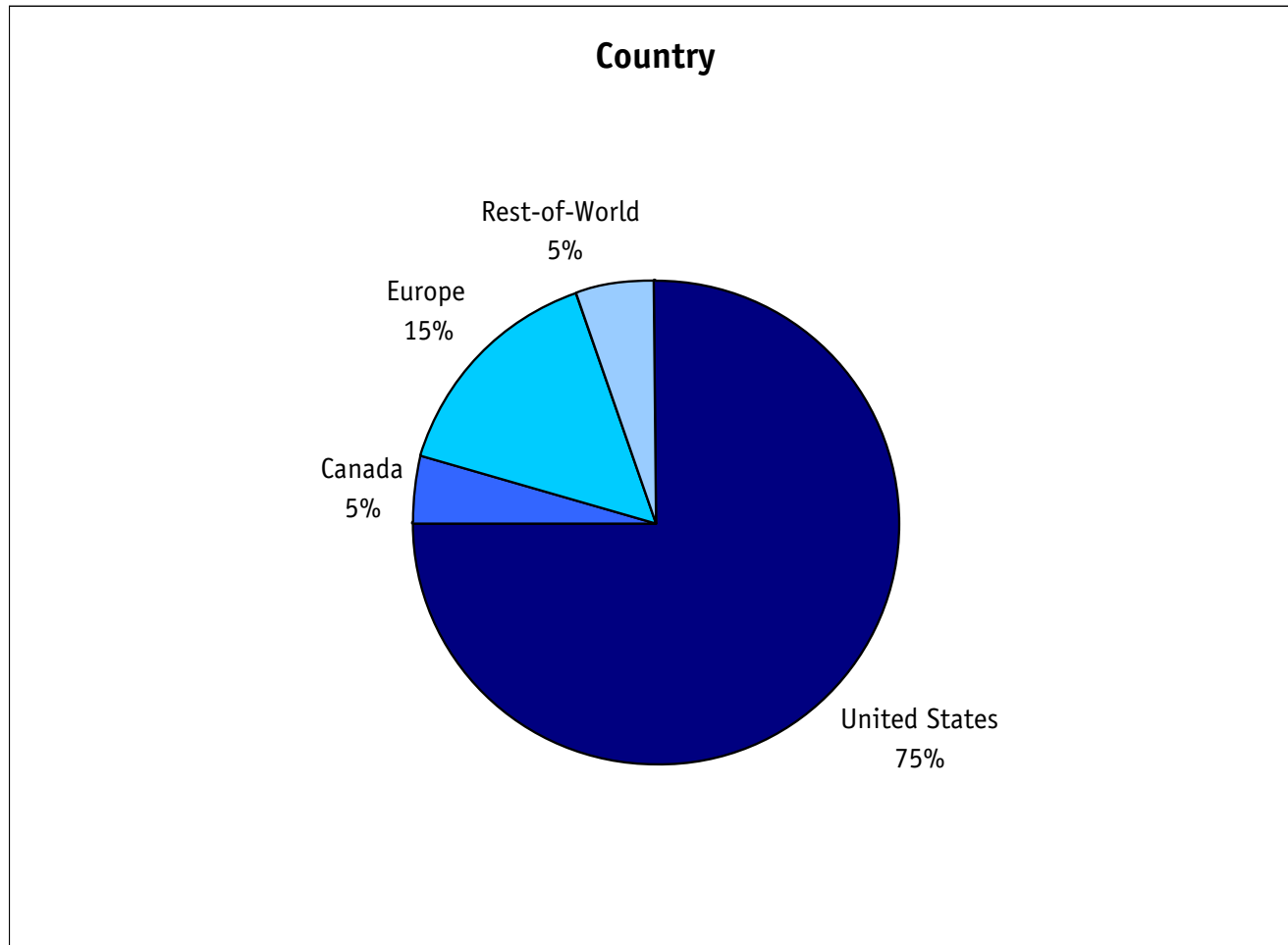
The survey consisted of 13 closed-ended questions. 7 questions included “other” as a response option, with space provided for the respondents to add the answer specific to their research.

Demographic information was evaluated from answers to 4 questions within the survey and from addresses provided by the respondents.

Results:

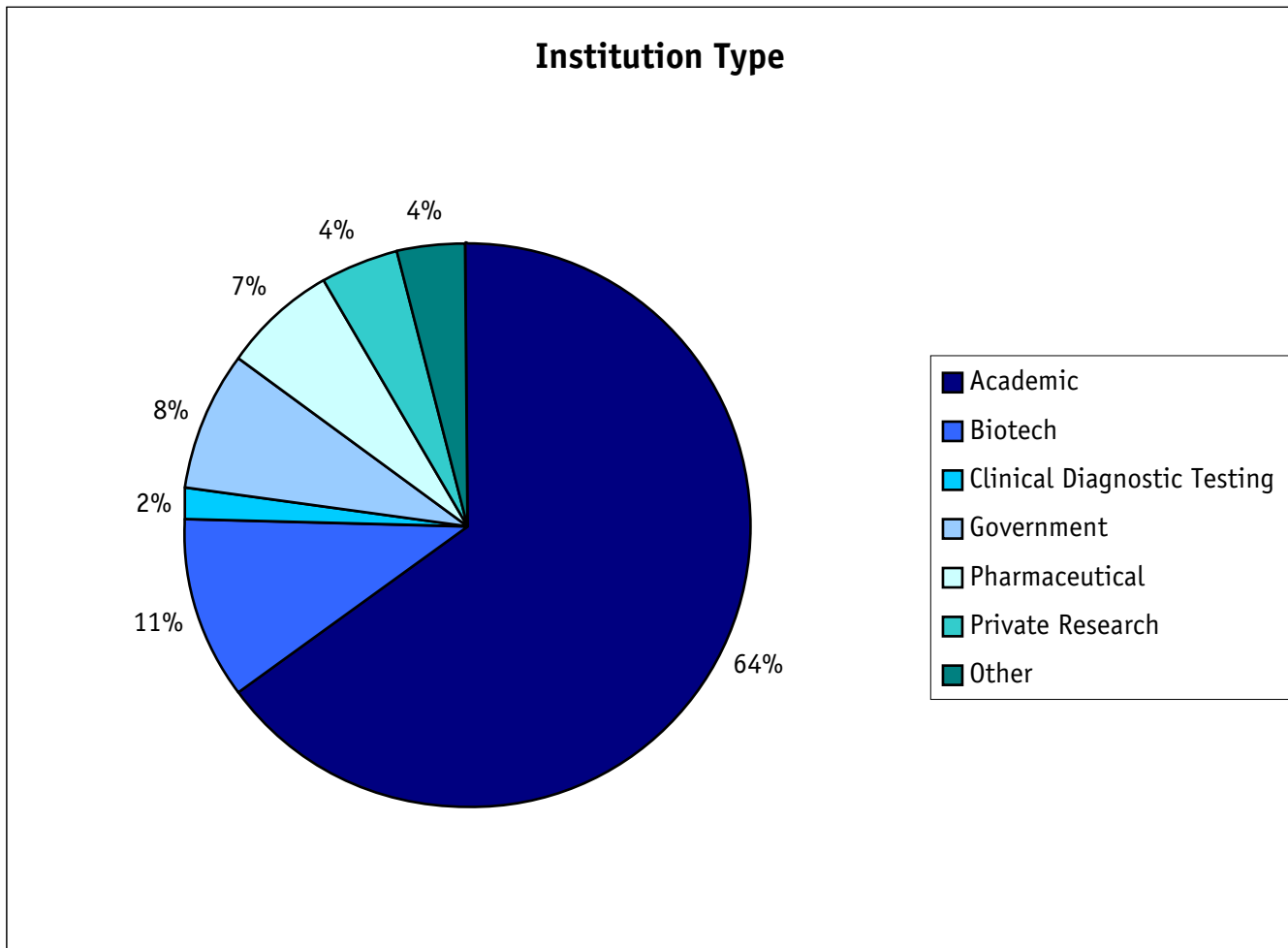
Demographics

75% of respondents are in the United States; 15% are in Europe.



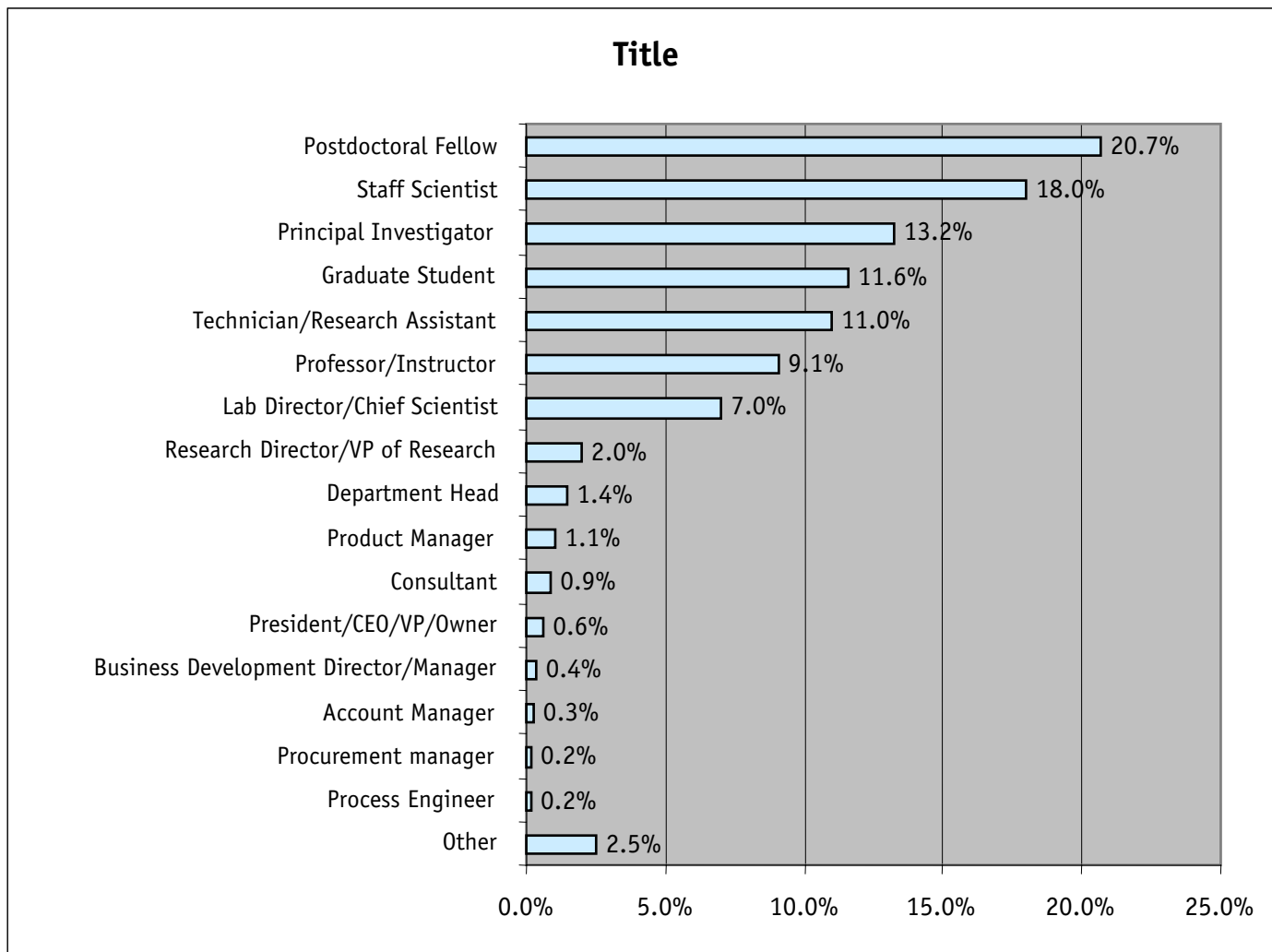
N=1045

64% of respondents work in academic institutions, 11% work in biotech companies, and 8% and 7% work in government or pharmaceutical institutions, respectively.



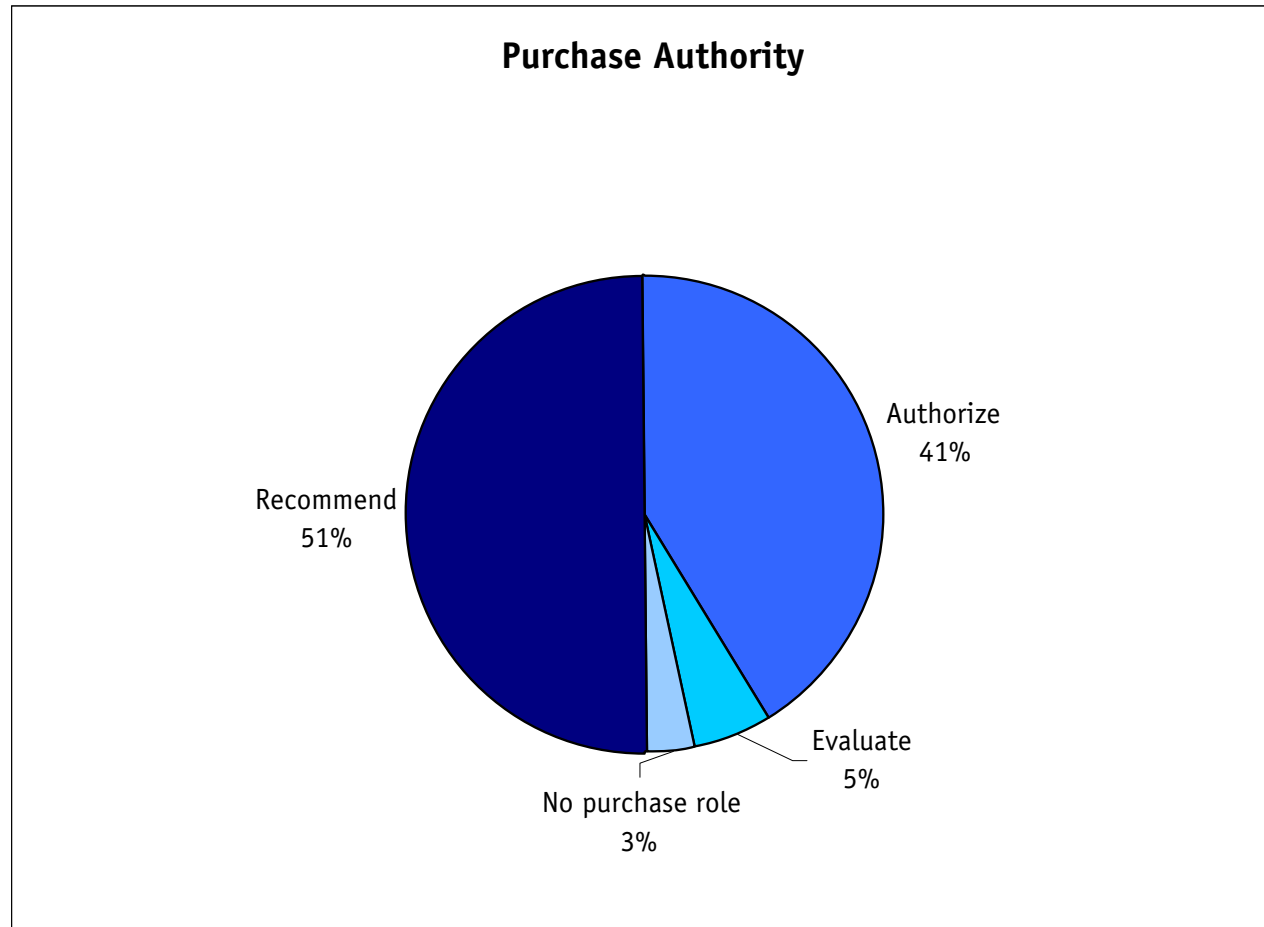
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74% of respondents work at the bench.



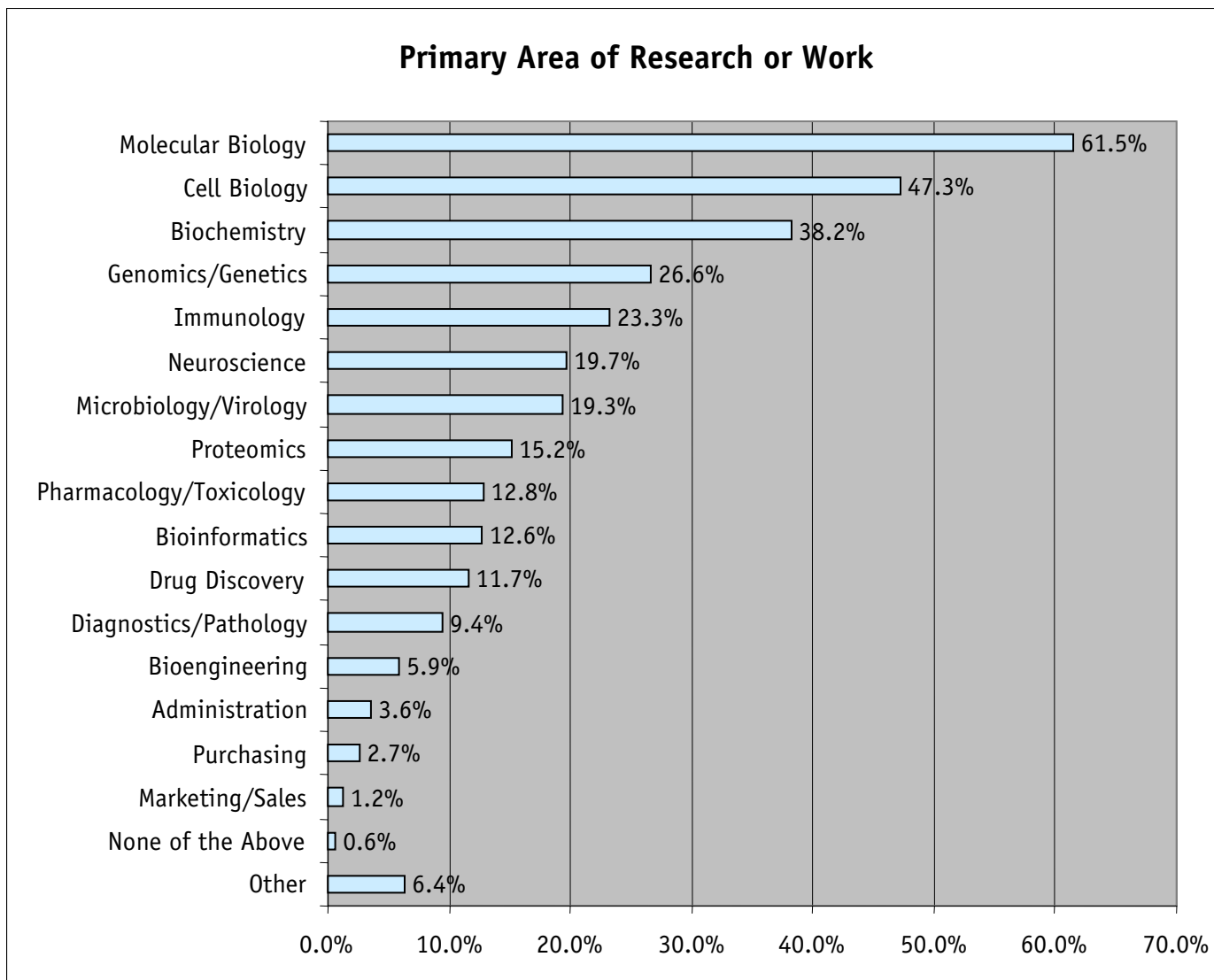
N=1045

Greater than 90% of respondents either recommend or authorize laboratory purchases.



N=1045

The majority of respondents (61.5%) identify molecular biology as their principal area of research or work.



N=1045

Which type(s) of software do you currently use?

(check all that apply)

- FACS Analysis Software
- Gel Analysis Software: 1-D
- Gel Analysis Software: 2-D
- Image Analysis Software
- Protein Microarray Analysis Software
- DNA Microarray Analysis Software
- Pathway Analysis Software
- Visual Data Analysis Software
- Statistical Analysis Software
- Biological Network Databases
- Data Mining Software
- High Content Screening (HCS) Data Management Software
- Protein Structural Analysis Software
- Sequencing Analysis Software: DNA
- Sequencing Analysis Software: Protein
- Electronic Laboratory Notebooks
- Document Categorization Software
- Enterprise Management Software
- Clinical Trial/Study Management Software
- Laboratory Information Management System (LIMS) Software
- Liquid Workstation Software
- Mass Spectrometry Software
- Measurement and Automation Software
- Melting Profile Software
- Primer Analysis/PCR Software
- Microarray Design Software
- None of the Above
- Other (please specify)

How often do you use this software?

- Daily
- Weekly
- Monthly
- Quarterly
- A few times per year or less

Which operating system(s) are you currently using?

- Microsoft Windows 97
- Microsoft Windows 98
- Microsoft Windows 2000
- Microsoft Windows NT
- Microsoft Windows ME
- Microsoft Windows XP
- Mac OS9 (or below)
- Mac OSX
- Linux
- N/A
- Other (please specify)

Do you have plans to purchase new laboratory software?

- Yes
- No

Which type(s) of software do you plan to purchase?

- FACS Analysis Software
- Gel Analysis Software: 1-D
- Gel Analysis Software: 2-D
- Image Analysis Software
- Protein Microarray Analysis Software
- DNA Microarray Analysis Software
- Pathway Analysis Software
- Visual Data Analysis Software
- Statistical Analysis Software
- Biological Network Databases
- Data Mining Software
- High Content Screening (HCS) Data Management Software
- Protein Structural Analysis Software
- Sequencing Analysis Software: DNA
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- Electronic Laboratory Notebooks
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- Measurement and Automation Software
- Melting Profile Software
- Primer Analysis/PCR Software
- Microarray Design Software
- None of the Above
- Other (please specify)

When do you plan to purchase this software?

- 0 – 3 months
- 3 – 6 months
- 6 – 12 months
- > 1 year

Which type(s) of instruments/applications would you like your LIMS to be able to interface with?

- (check all that apply)
- LC
 - GC
 - HPLC
 - Mass spectrometry
 - RIA
 - ELISA
 - Proteomics
 - ICAT
 - Gel electrophoresis
 - DNA Sequencing
 - Genotyping
 - Microarrays
 - N/A
 - Other (please specify)

Which feature(s) would you most like to see included in your LIMS software?

- Supports instrumentation from all major vendors
- Scalability
- Remote capability
- Sample tracking
- Reagent tracking
- Customized reporting
- Multiple simultaneous users
- Secure access
- Instrumentation calibration and tracking
- Audit trail
- GLP evaluation
- Barcoding
- CLP reports
- Scheduling
- QA/QC charting
- Quote generator
- Shipment tracking
- Invoicing
- Accounts receivable tracking/reporting
- Complaints handling
- N/A
- Other (please specify)

Which factors are most important when choosing laboratory software?

- (select 3)
- Ease of use/Minimal training time
- Speed of analysis
- Data integrity
- Scalability
- Multiple user capability
- Ability to interface with other software being used in the lab
- Hardware requirements (e.g. memory, processor, hard drive)
- Quality of technical support
- Warranty
- Availability of free upgrades
- Price
- N/A
- Other (please specify)

References

1. Gwynne P and Heebner G. Laboratory technology trends: Breakthroughs in Life Science Technologies 2. www.sciencemag.org/feature/e-market/benchtop/breakfinal.shl Feb 2, 2002.
2. Gwynne P and Heebner G. Breakthroughs in life science technologies: Technologies for tomorrow. www.sciencemag.org/feature/e-market/benchtop/breakthroughs.shl November 30, 2001.