

The Impact of Lab Equipment Downtime in Life Sciences

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Introduction: Stakes are High in the Life Sciences Industry

Automated lab instrumentation that is reliable and trouble-free is important to an industry where global pharmaceuticals alone spent over \$50 billion on R&D in 2002 and the average cost of bringing a drug to market is \$400 million to \$800 million. According to Sal Salamone, Senior IT Editor for *Bio-IT World*, unscheduled downtime can cost up to six months on a single drug discovery experiment. This can mean the difference between first to market with a new, patented drug—with twenty years of exclusive sales rights—and being left behind.

While instrument reliability and throughput are worth potentially millions and even billions of dollars in revenue, there is a dearth of research that examines instrument downtime and service issues industry-wide.¹ What are lab managers' experiences with the reliability of automated instruments such as protein analysis and DNA sequence detection systems, chromatography and mass spectroscopy systems, pipetting stations and micro array testing systems? Are they satisfied with the service and support they are getting from outside service organizations? What do they wish manufacturers could do better?

A new generation of Smart Service applications will arise that will permit an interactive dialogue to be created between assets in the field and applications.

Key Survey Findings

- Automated instrument downtime is a significant issue in the life sciences industry, where proper instrument performance is time and money
 - More than one-third of lab managers reported downtime problems, mentioning calibration and reagent problems most often
 - The drug discovery stage had the most instrument downtime
- Unreliable lab instruments adversely impact competitive advantage. Top problems cited were delays to project or time to market, higher tech workloads, and increased costs of operations
- Lab managers often complained that repairs were slow and that the instrument manufacturer field service organizations did not resolve the problem on the first visit
- Most instruments are not monitored remotely; instruments equipped with remote access mostly use primitive solutions
- Two-thirds of managers were responsive to IDM benefits, suggesting IDM is a viable solution; they mentioned:
 - faster/easier troubleshooting, better monitoring of instruments
 - the ability to catch problems before an instrument goes down

Life Sciences Equipment Service Survey

Customer Insights Group, on behalf of Trident Capital and Qestra, with cooperation from *Bio-IT World*, conducted a survey of life sciences managers who purchase automated lab instrumentation.² These are the customers of the equipment manufacturers. The survey had two purposes:

- To quantify downtime and service issues and to understand their impact on lab managers' businesses.
- To obtain information on interest in and use of a new approach to service called Intelligent Device Management (IDM) by Gartner and Qestra, and called Device Relationship Management (DRM) by others

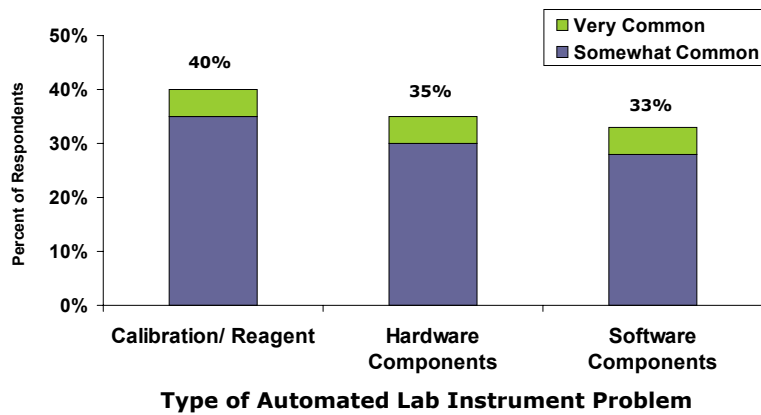
¹ Many instrument manufacturers conduct research on downtime and service, but these are proprietary and typically not made public. These kinds of studies typically encompass instruments from only a single manufacturer, not a category of equipment that spans multiple manufacturers.

² As true population characteristics were unknown, the survey used a sampling procedure that established screening criteria likely to capture information for those life sciences organizations that have the largest amounts of automated instruments. Survey respondents were screened for automated lab instrumentation purchase involvement, job function, and the type and size of organizations they worked in. Quotas were avoided and results are not weighted, so the sample is a "natural" distribution bounded by the parameters of the screening criteria.

The survey was fielded by the International Data Group (IDG) between February 20 and March 19, 2003.³ The sample consists of a total of 183 qualified respondents. All respondents had automated instrument purchase involvement. An overwhelming 79% of them were in scientific/R&D/executive management, with the remainder mostly in life sciences IT management. There was strong representation in pharma/biopharma (48%) and biotech (21%). Most respondents worked in large enterprise (57% in organizations with 1000 or more employees) and mid-market companies (31% in organizations with 100 to 999 employees).

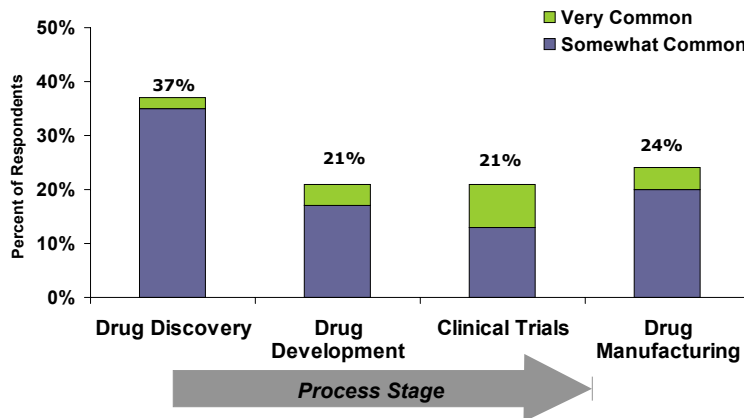
The Pain Points of Downtime

Substantial Downtime Problems



Total sample n = 154 to 170

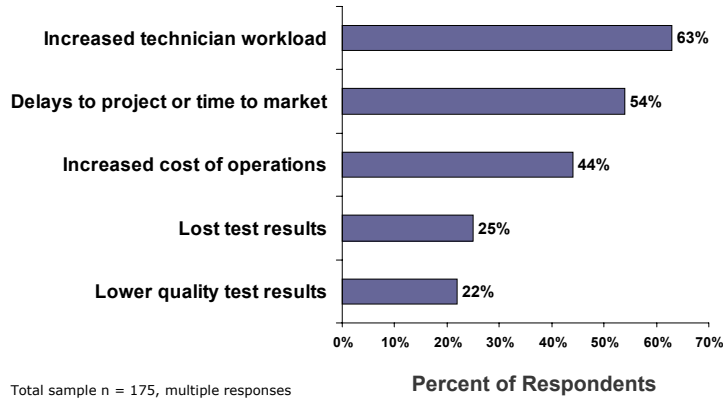
Downtime Worst in Drug Discovery Stage



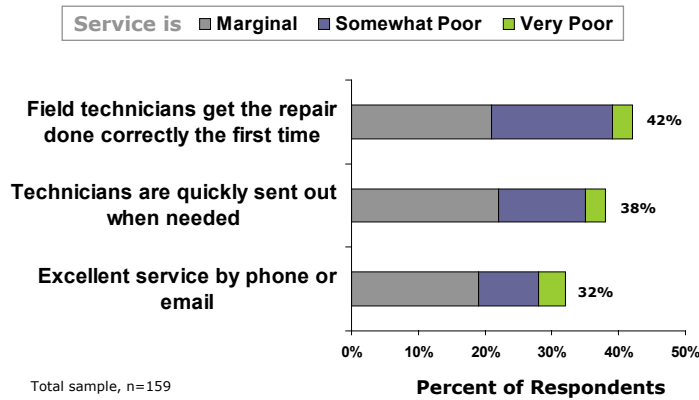
Total sample n = 49 (drug manufacturing) to 92 (drug discovery)

³ An on-line fielding method was used. Source names of individuals in life sciences for an "out-bound" survey invitation came from the *Bio-IT World* subscriber list and from lists of other IDG publications. "In-bound" respondents could also complete the survey by clicking on a button on the *Bio-IT World* homepage.

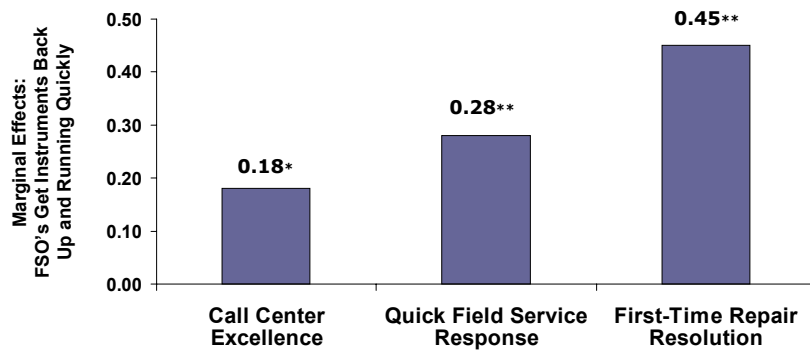
Downtime Seriously Impacts the Business of Life Sciences



Field Service Not Meeting Expectations



First-Time Repair Resolution has Most Impact



Total sample n = 156
 Model R²(adj): 0.61. Dependent variable, "The entire FSO service process gets our instruments back up and running in a timely fashion" regressed on three independent service type variables. All variables use same 5-point scale (1=very poor to 5=very good). Marginal effects of each variable (holding others constant) interpreted as follows: For each 1 point increase in an independent variable, there is a marginal increase in the dependent variable.
 * p<0.01 ** p<0.001

Substantial Downtime Problems Found

Do life sciences managers experience much downtime with their automated instruments? We asked respondents the following question, giving them a four-item rating scale that ranged from “very” to “not at all common”:

“How common have downtime problems been with your automated lab instruments over the past 6 months? By downtime, it is meant that an instrument is not operating or not performing correctly.”

The survey found they have, as a whole, plenty of downtime problems. The most troublesome area was with calibration and reagents; fully 40% of the sample said downtime was “somewhat” or “very common.” Thirty-five percent of the sample had trouble with automated hardware components that weren’t operating or performing correctly. Downtime problems were present regardless of organizational type and size, suggesting downtime spans many types of organizations whether they are large or small, in pharma, biotech or non-profit research.⁴

We wanted to find out how prevalent downtime problems were in different stages of the drug-discovery-to-manufacturing process. We asked respondents:

“At which stages in the drug-discovery-to-manufacturing process have you had instrument downtime problems over the last 6 months? Please give your best impression of the relative amounts of downtime you’ve experienced.”

They were shown four stages: the initial drug discovery stage, drug development, clinical trials, and, finally, drug manufacturing. For those stages their organizations were in, lab managers were asked to report relative amounts of downtime on a four-item scale ranging from “high” to “no downtime.”

We found high levels of downtime reported in the highly critical drug discovery stage. This is the initial discovery or experimentation stage where competition is fiercest. Thirty-seven percent of lab managers who were in this stage reported downtime as “high” and “somewhat” common. This proportion was significantly higher than in the more downstream stages, where downtime ranged from 21% to 24%.

Downtime Seriously Impacts Life Sciences

The survey established that lab managers have substantial downtime problems, particularly in the drug discovery stage and with hardware components, calibration, and reagents.⁵ What kind of impact do these problems have on their operations and businesses? We asked lab managers the following question, giving them a list of several items from which to choose from:

“What kind of impact has instrument downtime had on your business over the last 6 months?”

We found lab managers reported that downtime adversely affects their competitive advantage by increasing costs and reducing productivity. Over half said that downtime causes “delays in meeting project deadlines or getting to market” (54%), and “increased workload for technicians who have to troubleshoot devices” (63%). There were also complaints about lost test results and low quality results. Nearly half (44%) said downtime means “increased cost of operations” to them.

⁴ Results were statistically not different by organizational type and group size from the total sample.

⁵ Indeed, 62% of those reporting downtime as “somewhat” or “very common” in the drug discovery stage said they had problems with calibration or reagent problems; 62% also reported hardware downtime problems.

Field Service Not Meeting Expectations

Instrument downtime is partly a function of how well an instrument is built, but a big piece of the downtime function is speed of repair; that is, when an instrument goes down or shows signs of trouble, how quickly can a manufacturer’s field service organization (FSO) handle the situation? We asked lab managers the following question for several areas of service and gave them an opportunity to respond using a five-item scale:

“What is your experience with the servicing of your automated lab instruments [by the manufacturers/FSOs you work with]?”

We found that from the perspective of lab managers, while downtime is costly to life sciences, it appears manufacturers and their field service organizations aren’t doing enough to reduce it. Forty-two percent thought their service was marginal to poor on first-time repair resolution by field techs, and 38% had issues with the slowness of field repairs. The implication is that when an instrument is down, there is a good chance it will neither be repaired quickly nor correctly the first time.

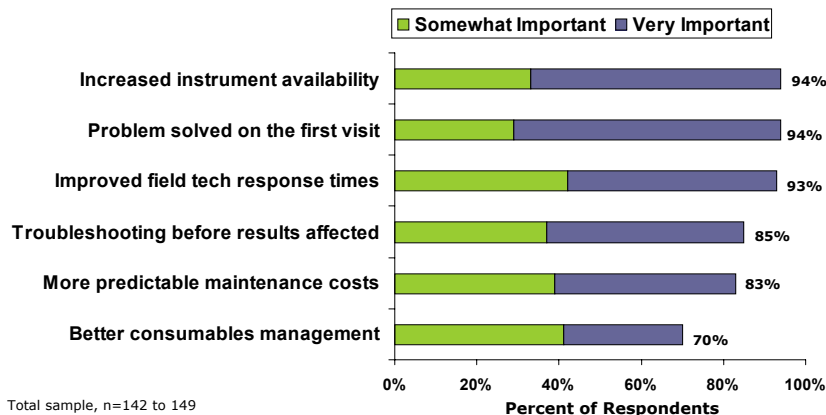
Where should field service organizations focus their efforts to improve service? Might service areas such as first-time repair resolution, quick response, and call-center excellence affect perceptions of overall service? Lab managers were asked to respond to the question using a five-item scale:

“Overall, the entire FSO service process gets our instruments back up and running in a timely fashion.”

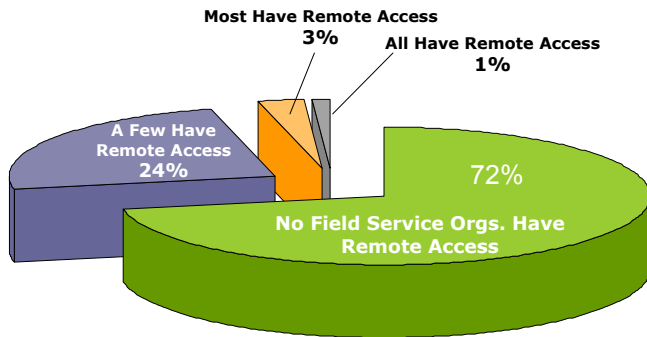
A model was developed that examined the effects of service areas on perceptions overall service excellence. All variables used the same five-point scale (1=very poor to 5=very good). We found that first-time repair resolution had the greatest effect on overall service excellence. For every point increase in first-time repair resolution, perceptions of overall service excellence increased nearly half a point (0.45). Call-center excellence had the least effect—it produced only a 0.18 point increase in overall service excellence—while rapidity of repair was in the middle (0.28). These results suggest that passive, reactive approaches to service such as call centers, while positively affecting perceptions of overall service, are weaker than proactive field service that insures instruments are returned to operating condition as quickly and accurately as possible.

IDM Provides Real Value to Real Customers

Customers Demand Proactive Service

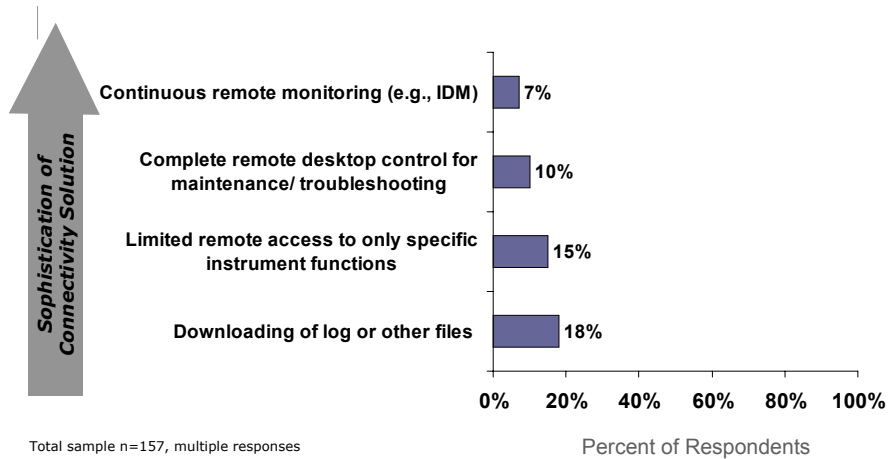


Instruments Disconnected

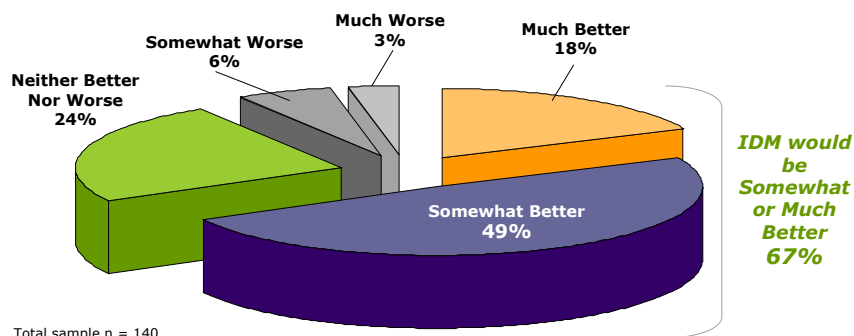


Total sample n = 157

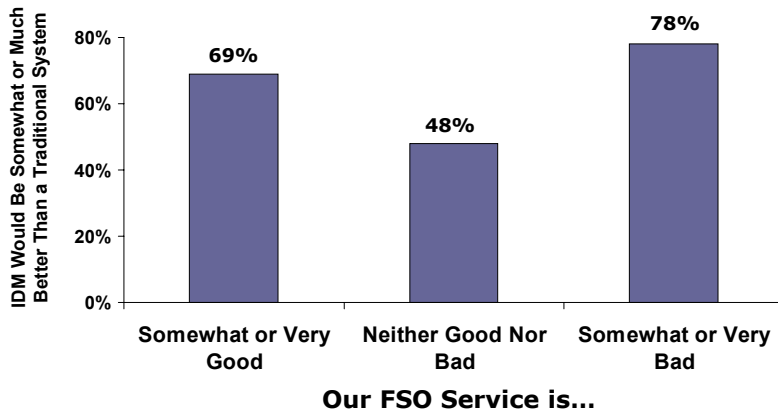
Primitive Connectivity Solutions in Place



Life Sciences Managers Want IDM Benefits

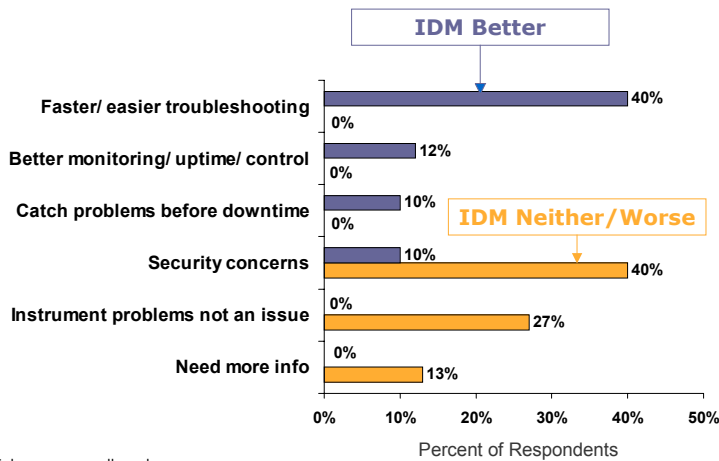


Interest in IDM Spans Field Service Quality



Crosstabulations, sample sizes for "Our FSO Service is..." categories: Somewhat or Very Good n=84; Neither Good Nor Bad n=29; Somewhat or Very Bad n=18.

Different Perceptions for Rating IDM Better or Worse



Multiple responses allowed. Sample sizes: IDM is "somewhat" or "much better" n=68; IDM is "neither" or "somewhat" or "much worse" n=28.

Customers Demand Proactive Service

Lab managers have downtime pain and are keenly interested in more proactive service. Other than improving response times and the accuracy of repairs, what can field service organizations do to improve their results? If they are offered proactive service, what do lab managers think about it? Respondents were presented with a neutral description of an IDM-based service system. Then we asked them to indicate the level of importance of several elements of the system to their organization, using a five-item scale ranging from "very" to "not at all important."

We found that lab managers resonate to the kinds of improvements that IDM can bring to both their instrument uptime and the servicing of instruments when required. High proportions of lab managers (ranging from 83% to 94%) said increased instrument availability, first-time problem resolution, improved field tech response times, troubleshooting

of instrument problems before they happen, and more predictable maintenance costs were “somewhat” or “very important” to them. The proportions of those who said these items were “very important” to them are higher in nearly all cases than those who said the items were “somewhat important.”

Instruments Largely Disconnected

The heart of IDM is remote monitoring. Are lab managers' organizations getting remote monitoring and diagnostics now? They were asked,

“Do your field service organizations have any type of remote access to your instruments for routine maintenance or problem troubleshooting? By remote access, it is meant that an FSO can have some kind of direct access or visibility into an instrument's performance functions from a location outside of your premises.”

Nearly three-quarters (72%) of respondents said none of the manufacturers servicing their instruments have remote access to them. Only 4% said that “most” or “all” have remote access. Recalling that these are people reporting from medium-sized to large organizations with numerous instruments, this is dramatic evidence that their instruments are mostly disconnected from any kind of remote monitoring and diagnostics.

For those organizations that have at least some remote access to instruments, what is the quality of access? We asked lab managers,

“Which of the following ways do your field service organizations obtain instrument performance data from remote locations outside of your premises?”

We gave them a list of four remote approaches to instrumentation data, beginning with the least sophisticated “downloading of log files only, or other files containing instrument performance parameters,” to the most sophisticated “continuous remote monitoring of instrument performance parameters (e.g., IDM system).”

We found that instruments are for the most part connected only occasionally and in the most rudimentary ways. Solutions that are often thought of as reactive, such as simple downloading of log files and dial-up command access to instruments, are used most frequently—but by only 15% to 18% of the total sample. More proactive real-time IDM service is rarely used—by only 7% of the sample. This is strong evidence that the full potential of IDM is largely untapped in life sciences.

Life Sciences Managers Want IDM Benefits

So at the end of the day, on which side of the fence do life sciences lab managers sit when they compare the service they're getting today to the kind of service IDM might provide? We asked lab managers the following question, and gave them a five-item scale ranging from “much better” to “much worse”:

“When you consider the automation of your laboratory processes, would an IDM-based service system be better or worse than a system with limited or no remote access to the lab's instruments?”

An overwhelming 67% of lab managers thought of IDM as an improvement over what they're getting now. Were the lab managers who thought IDM would be an improvement simply not satisfied with their current service, and interested in anything, just so long as it

promised improvement? We found that service problems do drive managers to seek better solutions. Seventy-eight percent of those lab managers who reported bad overall service experiences for their automated instruments thought IDM would be better than the traditional service model.

What about those managers who had good service experiences? While you might suppose that a manager who thought service is good enough would not want to bother with IDM, we found the opposite effect. Sixty-nine percent of these lab managers thought IDM would be better than traditional service. This result suggests these managers, even though they are somewhat satisfied with their overall service, think there is room for improvement in their service. They want to obtain the benefits an IDM solution offers.

We wanted to find out from the lab managers, using their own words, why they believed IDM was better or worse than traditional service. We asked them,

“Could you amplify on why you said an IDM-based system would be [their previous response—much better, somewhat better, neither, somewhat worse, much worse] than a system with limited or no remote access?”

We found benefits of IDM outweighed some of the issues to many managers, but security concerns cited by both groups are a flag to IDM providers that they will need to address security to the satisfaction of end users. For the two-thirds of the sample that thought IDM was better, 40% cited “faster troubleshooting/reduces troubleshooting and repair time” or “easier troubleshooting/describe problem better.” Another 12% liked the “better monitoring/better maintenance/better uptime/better instrument control” it could provide. Ten percent said they wanted to “know the instrument requires servicing before it goes down/catch problems before they happen.” Another 10% mentioned various security concerns. For the remaining one-third who thought IDM was neither better nor worse/or worse than what they currently have, 40% mentioned security concerns (this was one of the only items where the two groups overlapped). Another 27%, many in basic research, told us “instrument problems are not an issue.” Finally, 13% wanted more information.

About the Author

Michael Hulfactor, Senior Partner for Customer Insights Group, focuses on customer demand and targeting in business markets in the U.S. and worldwide. He has managed numerous proprietary studies over the past eleven years with global technology companies including IBM, Oracle, Sun, Netscape and Apple, as well as startup companies. Specializing in quantitative research management and analysis, he was formerly chief analyst for the Division of Academic Computing at the University of California, San Diego. He has a Ph.D. in administration and policy analysis from Stanford University.



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