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## SOCIAL MEDIA GONE VIRAL

ONCE CONSIDERED SUPERFLUOUS,  
SOCIAL MEDIA HAS NOW BECOME  
A VITAL TOOL FOR SCIENTIFIC  
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## Social Media Gone Viral

Once considered superfluous, social media has now become a vital tool for scientific information sharing, knowledge building, and networking. Twitter, Facebook, and the like have insinuated their way into every nook and cranny of society—labs included.

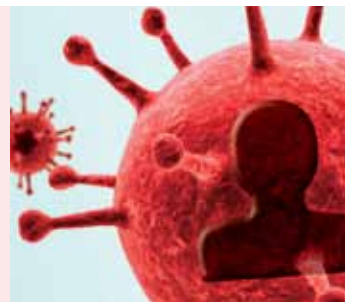
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## Perspective On: A Polymer Lab

Jason Todd is in the business of solving puzzles—in the laboratory. As a manager of the liquid chromatography lab and co-manager of the gas chromatography lab at Polymer Solutions Incorporated (PSI) in Blacksburg, Virginia, he's continually solving chemical and material mysteries.

**Sara Goudarzi**



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Communication problems are all around us—two people talking about two completely different things and thinking they are communicating. People not paying attention to what the other person is saying—simply buying time to say what they want to say. Here are some tips on how to communicate more effectively. **Ron Pickett**

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#### Are You Planning to Go Automated?

If you're thinking about automating your lab, you'll definitely want to consider registering for our webinar series—"Lab Automation Is Inevitable: Are You Ready?"—which we are running in conjunction with the Institute for Laboratory Automation as part of the Lab Automation University Program. We first mentioned the series in our July 2012 issue and the start date of the first webinar is already just around the corner—Sept. 11. That first session is absolutely free so if you are unsure whether this series is for you, you can test the waters with that half-hour session, which will cover why lab automation is inevitable and how your lab can plan for those changes. Other topics will include why people are concerned about lab automation, options for improving productivity, management's role in lab automation purchasing decisions, and the latest technologies available. The program includes eight webinars in total and concludes on January 29, 2013.





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## If you can't beat them, join them

Driving back to my office today, I heard an interview on NPR with Lisa Randall, Professor of Physics at Harvard University. She was there to talk about new discoveries in the field of physics, including new evidence for the existence of the Higgs boson. In the context of her discussion she said, "I think it's fairly widely known by now that the World Wide Web was developed at CERN ... and that was awhile ago."

Twenty-one years ago to be precise. And why did CERN develop it? "To get experimenters in different countries to be able to talk to each other as if they were in the same room."

While the need for trans-global collaboration was obvious in 1991, the reluctance of the scientific community to embrace the social media aspects of the Internet for that same purpose seems curious. As recently at last April, we were asking the question: "Are laboratory professionals ready to take advantage of [social media's] new communication tools?" The answer then was uncertain. However, this month's cover story answers with a resounding "yes."

"Social technologies have become a means of exchanging information among a network of peers in scientific and lab contexts. The dissemination of interesting research findings or controversial studies will increasingly flow through social media channels. That's not up for debate. It's just a fact," says Dietram Scheufele, professor and director of graduate studies for life sciences communication at the University of Wisconsin.

Mark Lanfear in this month's "Science Matters," (page 34) says, "However your business ends up using social media in the sciences, just know that the trend is not likely to wane. If you can get a grip on it now and explore how you can use it to your advantage, you'll already be well on your way to succeeding in the scientific workplace of the future."

In "No Boundaries," (page 16) John Borchardt echoes the same sentiment as it pertains to managing global teams: "Some managers view social media such as Facebook and Twitter as time-wasting distractions. However, they can offer advantages for global collaboration because they create a sense of community. Social media offer a new style of collaboration through profiles, status updates, groups, feeds, lists, and filters."

Borchardt also stresses good communication practices when it comes to managing a global research enterprise, reminding managers to "use some of the same principles as employed in effective listening but do so in writing. The most important principles include asking open-ended questions and restating what another person wrote in order to clarify understanding."

And speaking of communication, in his article, "Talk the Talk," Ron Pickett provides some unique and somewhat counter-intuitive advice for communicating effectively with your staff. One topic is how a manager should deal with work/friend relationships. "Building the work/friend relationship and making it work is one of the most difficult issues managers face. It begins when you first take on the responsibilities of leadership and it never goes away." Turn to page 24 to learn more.

Whether you are interested in purchasing new or upgrading your current LIMS or ELN, you would be wise to read this month's INSIGHTS supplement, which takes an in-depth look at laboratory data management systems. From trends in the technology, to maintenance and upgrade considerations, to honest insights for end-users, there is a wealth of information to help you make the very best purchasing decision.

Enjoy the fall season.

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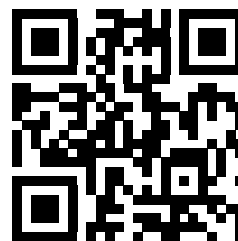
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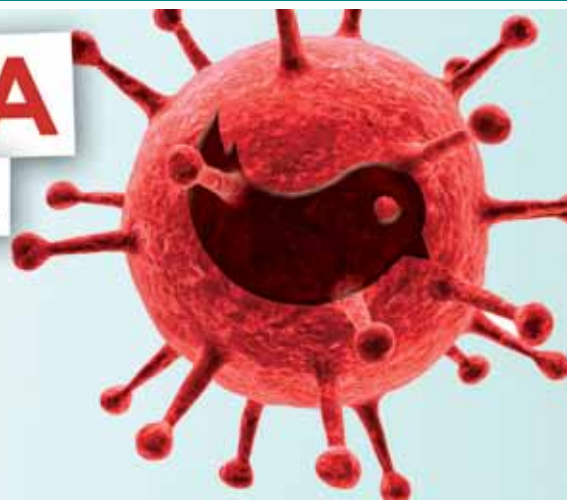
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# SOCIAL MEDIA GONE VIRAL

**ONCE CONSIDERED SUPERFLUOUS, SOCIAL MEDIA HAS NOW BECOME A VITAL TOOL FOR SCIENTIFIC INFORMATION SHARING, KNOWLEDGE BUILDING, & NETWORKING**  
by F. Key Kidder



Not that long ago dialogue was the communication problem *du jour* in the scientific community.

The prevailing deficit communications model had been discredited. Scientific monologues that stuffed factoids into the knowledge void of the nonscientific public were boomeranging. Audiences couldn't penetrate the scientific jargon wall or relate to scientific enterprises—your research is well and good, they said, but what's in it for *us*? Scientists had no appetite for tedious public engagement. Funders and institutional heads wanted clear evidence that scientists were fulfilling their part of the social contract. And pharma, meanwhile, was buried under mounds of miscommunication mistrust.

Greater engagement was the order of the day, and it had better be good. So communication researchers stepped up to craft recommendations to get the ball rolling and move dialogue along through local media, educational channels, and the like, hardly the stuff of broad impact.

Social media? It was an aside, a footnote. Best practices? Social media wouldn't stand still long enough for anyone to learn what they were dealing with. The social media concept had itself, as they say, gone viral.

Fast forward to 2012. Want broad impact? Step right up. Want dialogue? Social media is digital dialogue on steroids. Engagement? It was occurring to the twentieth power, and with a more symmetrical communications paradigm than the one-way deficit model. Social media is two parts social, one part media. Listen in. Was there ever a better way? But getting a grip on social media

remains a challenge. Untamed and unpredictable, it rolls like a cyber tsunami, sweeping and reordering the communication landscape.

Twitter, Facebook, and the like have insinuated their way into every nook and cranny of society—labs included. Innovators in the use of research technologies, scientists tend to be late adapters of social media platforms. In one 2011 poll of 200 lab managers, 80 percent were total strangers to Facebook, 60 percent to Twitter.

Most insurmountable is the value scientists place on empirical truths and peer review, juxtaposed with the loose talk and quick judgments of social media. With their conservative mien, scientists are repelled by the havoc, the unknowns that troll social media sites. Some contend that scientists, with their natural left-brain orientation toward analysis and logic, lack the skills to supply the right-brain kind of creative, chatty content that dominates social platforms.

But that hasn't stopped them all. "Much worse than a good scientist communicating poorly is a nonscientist spreading pseudoscience plausibly," said blogger Strangetruther, sounding ready to straighten out social media miscreants. Brad Voytek, a postdoc at the University of California, uses Twitter for research feedback. "[Scientists didn't achieve] their breakthroughs because they communicated less," he said. Alistair Dove, senior scientist at the Georgia Aquarium Research Center, uses Facebook and Twitter to share his "passion." Funders like such outreach, he says, and it ensures his science is accurately portrayed, avoiding misunderstandings that can interfere with trust.

"Social media is digital dialogue on steroids."



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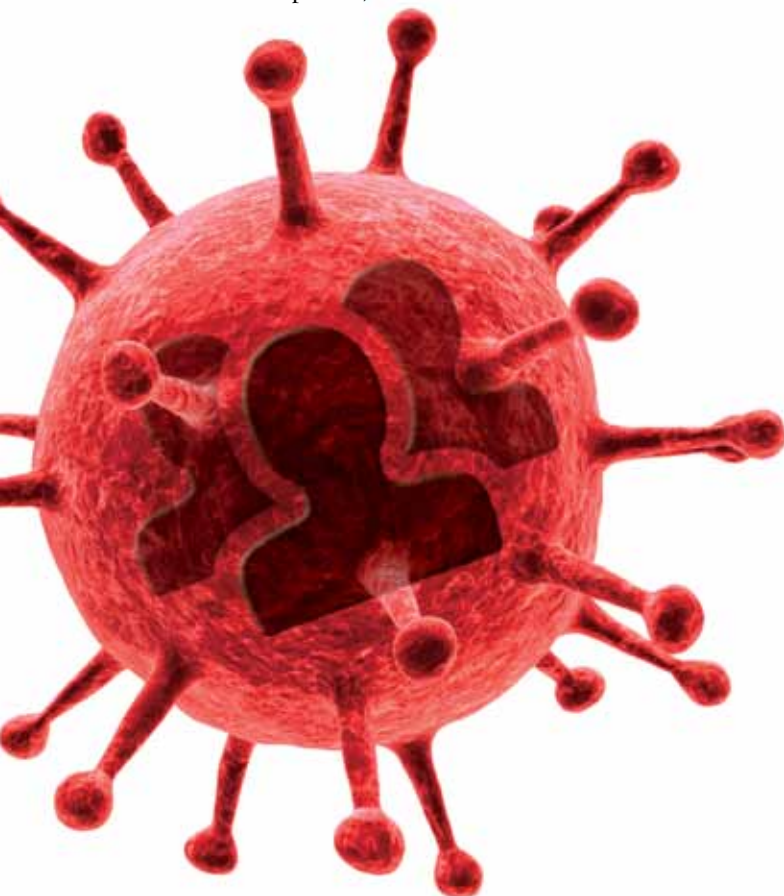
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“The scientific community needs to understand what ethical practitioners of public relations have long known: Trust is not about information; it’s about dialogue and transparency,” said the authors of the essay “Managing the Trust Portfolio: Science Public Relations and Social Responsibility” published in an American Academy of Arts & Sciences collection.

It’s a contentious point of departure for scientists who see no place in the profession for PR or self-aggrandizement. A 2012 Kelly Services worldwide survey of 170,000 found that 53 percent of respondents in the Americas believed social media hinders workplace productivity, compared to 41% in Europe, Africa, and the Middle East and 34% in Asia-Pacific nations. But in this brave new digital world, social media, superfluous in the yesteryear, has assumed a primary role as the connective tissue linking scientists and nonscientists—for better or worse. Twitter, Facebook, and cohorts, if not quite pillars of scientific communication in all quarters, are established agents of change that inexorably impact many of the ways lab managers do business, serve their career development, and interact with constituencies.



The stereotypical view has millennials and younger scientists—avid users, often proselytizers—as the first to take the plunge. They may regard any scientist without an active web presence as a Neanderthal. Older scientists, some dismissive, are more inclined to sit it out. A third group gathers at the water’s edge, one toe timidly in. They perceive social media to be important but are uncertain where its real value lies.

“The qualities that make Twitter seem so inane and half-baked are what make it so powerful.”

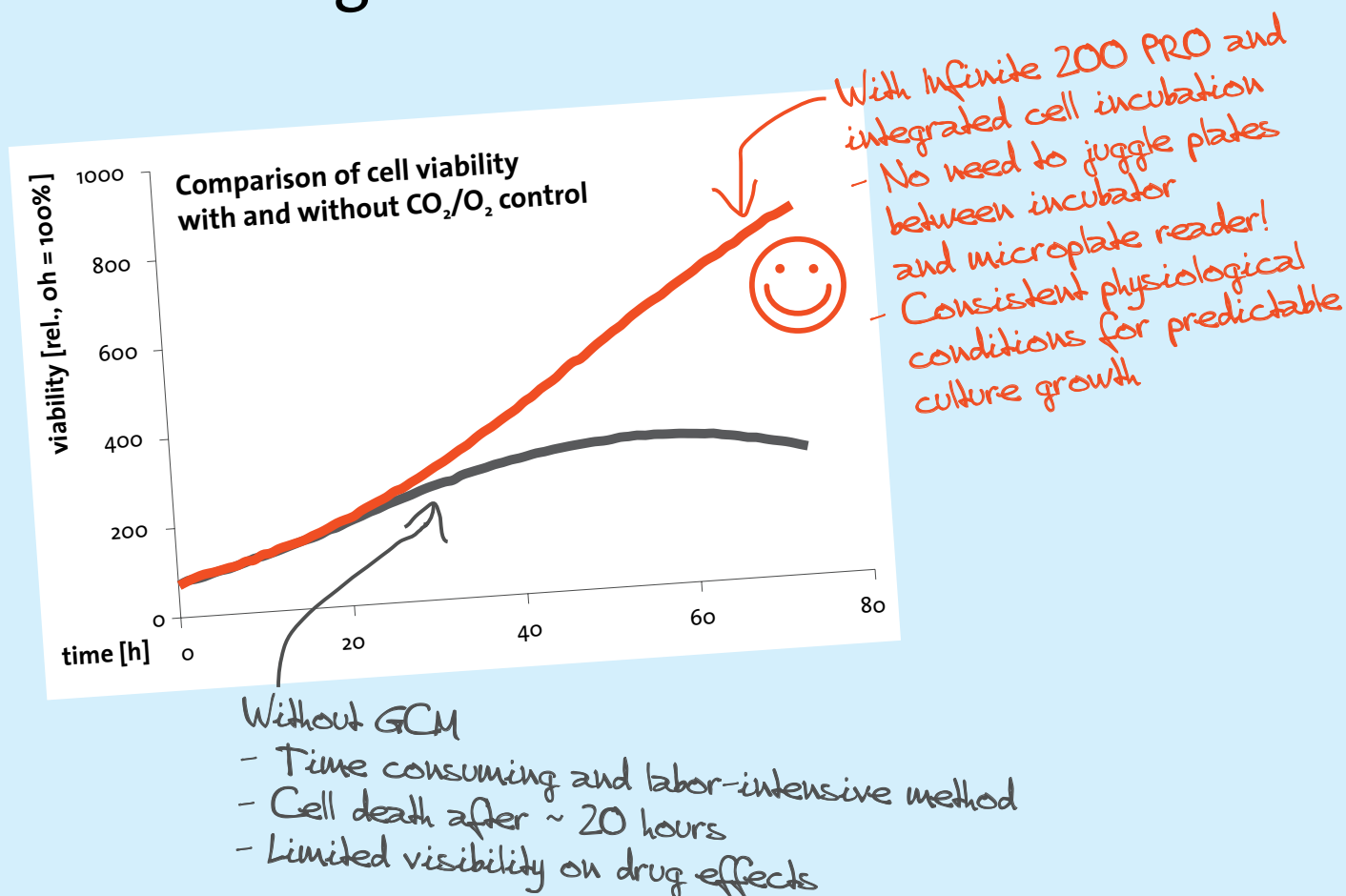
But that is changing. Life scientists say it increasingly influences their decision making. Social media use is up among all age groups, says Pew Research, as is its penetration among the scientific community. In a 2012 AstraZeneca poll of 372 of its scientists (37% from the UK, 31% from Sweden, and 25% from the U.S.), 18% said social media is very valuable, 33% said valuable, and 35% said somewhat valuable. Social media’s value lay in information sharing/networking (62%), knowledge building (61%), networking (61%), discussions (33%), and getting the message out/thought leadership (10%). The most popular channels were professional networks (79%), wikis (53%), and blogs (50%).

### Popular platforms:

**Facebook:** Some scientists create a Facebook page solely for professional purposes to avoid the zanies. Others share photos and comment on daily lab life. One benefit is to demystify and humanize scientists—in the popular imagination, scientists may seem humorless nerds, peering into test tubes through thick eye-glasses. Photos can overcome that image and give a fresh face to a profession that needs it to recruit young talent. Asked to name any living scientist, most can summon only Stephen Hawking.

**Twitter:** Hashtags are hot, but beware tweets becoming tw-oops! Buckle up, it can get fast and furious, which makes Twitter prime debate territory for scientists willing to exit their comfort zone. “The qualities that make Twit-

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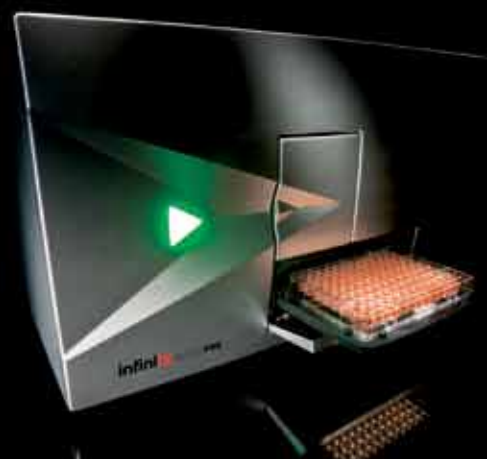


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ter seem so inane and half-baked are what make it so powerful,” said Harvard professor Jonathan Zittain, codirector of the Berkman Center for Internet and Society. The mundane can morph into something far more significant as users retweet, cut and paste, aggregate, and amplify. It’s the stuff of discovery and innovation.

“Social media use is up among all age groups, says Pew Research, as is its penetration among the scientific community.”

LinkedIn: This is the choice for scientists who want to present a “professional” image and avoid reputation management miscues that can damage careers. Activity is occupation-centric. Creating a good LinkedIn profile is key for networking. It has strong appeal across all age groups. Users can post news and links or use LinkedIn as a directory to learn about the industry and the competition.

### Science outreach trends toward cyberspace

Niche social media sites attract clusters of scientific professionals—among the first were LabSpaces for researchers, Surgytec for MDs and Ph.D.s in medical sciences, and Scitable for scientists and researchers focused on genetics and cell biology. NASA Connect is the organizational mother site for NASA’s roster of social media platforms. More recently Google + “has become a playground for science folks who have crowdsourced a database of others with similar interests,” said Dietram Scheufele, professor and director of graduate studies for life sciences communication at the University of Wisconsin.

Science increasingly depends on digital technologies to communicate and convey. The Internet has already overtaken print media as the main source of science news. There’s a new science news cycle now. Aunt Tilly probably doesn’t read about it anymore. Research is first keyboarded into cyberspace, where it’s picked up by the university PR office and forwarded to newswire organizations, which feed cable news, which in turn supply the local news stations that Aunt Tilly watches on TV. Even

Twitter, with its paltry 140-character limit, figures to play a bigger part in the news business. “The essentials of what Twitter does are an integral part of the news system of the future,” said David Winer, former editor of *Wired*. A headline, brief synopsis, photo or illustration, and link to the full article are all it takes.

If you can’t beat them, join them. “Savvy scientists must increasingly engage with blogs and social media,” said Paul Knoepfler, a University of California Davis professor who posts a blog about his stem cell lab. “Even if you choose not to blog, you can certainly expect your papers and ideas will increasingly be blogged about. So there it is—blog or be blogged.” Lab managers can spring into action after notable developments or small victories, in effect becoming opportunity managers.

“Google + has become a playground for science folks who have crowdsourced a database of others with similar interests.”

Social technologies “have become a means of exchanging information among a network of peers in scientific and lab contexts,” said Scheufele. “The dissemination of interesting research findings or controversial studies” will increasingly flow through social media channels. “That’s not up for debate. It’s just a fact.”

Social media, he adds, “is increasingly an important tool for hiring. A quick check on Facebook or LinkedIn by human resources staff is the norm rather than the exception. And it seems applicants have become more savvy with respect to Facebook privacy settings and what they share with public audiences.” The hiring door swings both ways in social media. Applicants with a strong social conscience can vet prospective employers for their record on issues. Kelly reports that 26% of life scientists are now more inclined to search for jobs via social media than by traditional methods.

“Younger generations aren’t going to look for your company or society in print—they’re going to go directly

to your website and then maybe your Facebook page, and if interested they will follow you on Twitter,” said Kea Giles, managing editor at the Geological Society of America. “If you’re not there, neither will they be—and then you’ve lost them at a critical point of contact.”

Social platforms abet research too. Academic scientists, long fragmented, are joining ResearchGate, a Berlin-based social network that aims to enhance global collaboration by circumventing the lengthy peer review process. Instead of waiting for research to appear in an elite handful of journals, ResearchGate’s “open science” system allows members to share papers, knowledge, and ideas. It is described as a “mash-up of Facebook, Twitter, and LinkedIn,” with membership approaching 1.5 million. GlaxoSmithKline is an industry leader in social media. Not only does it listen to consumers and give voice to employees to promote trust and flatten silos, but it also enhances R&D by bringing global colleagues closer together, sharing digital platforms.

“Even if you choose not to blog, you can certainly expect your papers and ideas will increasingly be blogged about.”

Social media, remarked one blogger, “is not a thoughtful environment.” Nor does social media always keep things sociable. With so many users who shoot from the lip, it can devolve into a repository for free-floating hostility or a battleground. Information flows in different ways, making it difficult to control. Social media never sleeps, so staying on top of discussions and threads can become high maintenance.

Brand and management, exposed to the roar of the crowd, can feel the heat. Big pharma wages its trust offensive by maintaining a significant social media presence. One characteristic of social media sites is a means for users to leave comments. Most drug companies refrained from joining Facebook until they were granted a privilege others didn’t have—blocking the public’s ability to openly post comments. When Facebook reversed

itself in 2011, saying it wanted “authentic dialogue between people and businesses,” a number of companies shut down their Facebook pages.

*F. Key Kidder left journalism to pursue a career in government relations, politics, and PR, but he still likes to keep one hand in writing. He can be reached at [k2@keykidder.com](mailto:k2@keykidder.com) or by phone at 410-963-4426.*

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# NO BOUNDRIES

**HOW TECHNOLOGY CAN FACILITATE MANAGING RESEARCH TEAMS ACROSS TIME, CULTURES, AND DISTANCE** by John K. Borchardt

Large companies and government agencies often have laboratories dispersed over a wide geographic area—sometimes around the world. Staff members at some of these far-flung laboratories often work together on project teams. Coordinating their efforts can be daunting. Lab managers face the challenges of giving these people a sense of common purpose, a clear sense of their roles on the project team, and an understanding of the roles of their distant coworkers. Managers have to understand what is going on at remote laboratories sufficiently in order to provide long-distance project team members with the resources they need to accomplish company goals while nurturing their career aspirations. Accomplishing this is difficult when tight lab budgets at many firms have greatly reduced business travel between laboratories.

Collaboration can be an important innovation and business driver. From a laboratory manager's perspective, the primary purpose of collaboration is to promote the sharing of information, the coordination of effort, and, thus, the acceleration of innovation. Collaboration across organizational and political boundaries and across large distances is increasingly a business necessity for firms to prosper and grow, and even to survive. This collaboration often must be achieved despite time zone differences that leave some lab team members hard at work while others are snug in their beds.

## Technology enablers of collaboration

A study by consulting firm Frost & Sullivan (jointly sponsored by Verizon Business and Microsoft Corp.), "Meetings Around the World: The Impact of Collaboration on Business Performance," defines collaboration as the interaction between people enabled by technology such as audio and Web conferencing, e-mail, and instant messaging.<sup>1</sup>

"Collaboration can be an important innovation and business driver."

Collaboration software and communications technology enable the increasingly sophisticated sharing of information and ideas despite the separation of distance and time zones. Project managers can lead people separated by thousands of miles in developing strategies, performing R&D, and protecting the intellectual property that results. Earlier generations of researchers and laboratory managers made do with telephones, fax machines, and business travel. Business travel was time consuming and expensive, while the telephone involved speaking and hearing with no visual component.



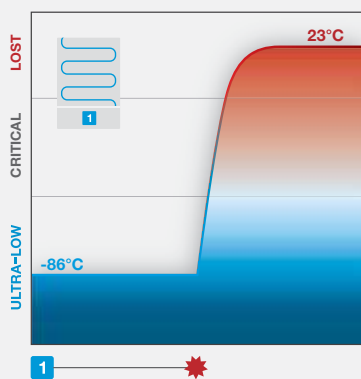
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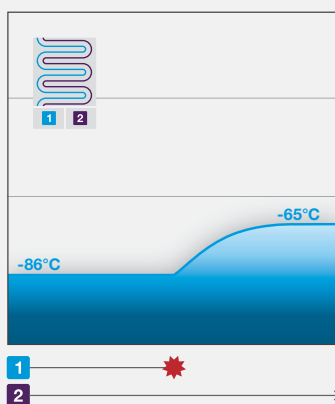
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Wikipedia offers a lengthy list of collaborative software<sup>2</sup> that enables coworkers thousands of miles apart to work together on projects. This software includes both fairly expensive commercial software and freeware. Software types include project management software, presentation software, word processing software, messaging software, and collaborative meeting software.

“Methods most used in high-performing companies are Web conferencing, audio conferencing, and meeting scheduling technologies.”

The WWW also enables firms to buy and sell intellectual property through the vehicle of open innovation.<sup>3</sup> Commercializing this intellectual property often requires extensive communication and collaboration between the buyers and sellers.

### “Meetings Around the World”<sup>1</sup>

The “Meetings Around the World” study findings indicate “collaboration can positively impact each of the gold standards of performance—profitability, profit growth, and sales growth—to determine a company’s overall performance in the marketplace,” says Jaclyn Kostner, Ph.D., an expert on high-performance virtual collaboration. “As a general rule, global companies that collaborate better, perform better. Those that collaborate less do not perform as well. It’s just that simple.”

The study surveyed 946 information technology and line-of-business decision makers from a cross-section of 2,000 small-to-medium, midmarket, and global companies in the U.S., Europe, Japan, Australia, and Hong Kong. Technologies included in the study were e-mail, meeting schedulers, instant messaging, videoconferencing, audio conferencing, Web conferencing, desktop or wired PC, mobile/wireless PC, personal digital assistants with and without Web access, mobile phones with Web access, and pagers. Study findings indicated the three collaboration methods most used in high-performing companies are Web conferencing, audio conferencing, and meeting scheduling technologies, with Web conferencing the most commonly used tool. “Measuring the quality and capability of collaboration in a given organization presents an opportunity for management to prioritize technology investments, encourage adoption of new tools, and open up communication lines for improved collaboration,” says Brian Cotton, a vice president at Frost & Sullivan.

Study results also indicated there were regional differences in how people prefer to interact and collaborate. For example, American professionals were more likely to prefer to send e-mail rather than telephone someone. They are also more comfortable with audio conferencing, videoconferencing and Web conferencing technologies than are people of other regions. Compared to professionals from other regions, Americans multitask the most while on conference calls or attending virtual meetings. Europeans prefer telephoning because they like to interact in real time. More than anywhere else, professionals in the Asia-Pacific region want to be in touch frequently during the workday—hence they prefer telephoning and instant messaging.

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“Each person on the project should be educated on his or her role in the project and how to work effectively in that individual role.”

### Social media

Some managers view social media such as Facebook and Twitter as time-wasting distractions. However, they can offer advantages for global collaboration because they create a sense of community. Social media offer a new style of collaboration through profiles, status updates, groups, feeds, lists, and filters.

The concern many organizations have with social media is associated with controlling access in order to maintain confidentiality of proprietary information while still allowing large numbers of people to participate. Many compa-

nies have created project wikis within their corporate websites. Team members must complete sign-in procedures and provide passwords to access information stored in the wiki. After signing in using a password, team members can collaborate and report results.

### Leadership

Effective leadership is essential for laboratory managers, project managers, and team leaders to achieve success when working with geographically dispersed people they do not control and seldom meet with face-to-face. In contrast, traditional management involves leaders achieving success by working with people they control. There should be one overall leader and sub-leaders for each team involved in big, multi-laboratory projects. This lessens any negative impact caused by major time zone differences. These leaders should agree on the role of each team involved in the project. From the top leadership on down, each person on the project should be educated on his or her role in the project and how to work effectively in that individual role.



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Leadership goes beyond understanding and executing a project strategy. Leaders have to understand the perspectives of the diverse team members and encourage communication and a sense of community. They need to understand how cultural and staff age differences can impact what motivates project team members. Leaders need to act before conflicts arise by playing dynamic roles as mediators and communicators. They may need to resolve conflicts between individual and common goals.

Leaders also have to be willing to take calculated risks. To build enthusiasm for the collaborative effort, they must be passionate about it themselves. They must be optimistic, not pessimistic. They need to share knowledge, power, and credit for success.

### Risk management

If the project is highly strategic to a firm, there can be risks involved in relying too heavily on outside collaborators. These risks can often be dealt with by carefully dealing with potential issues in the contract defining the working relationship between the two collaborating organizations. The most obvious risks are ownership and use of intellectual property developed through the collaboration. A related concern is that a collaborator's level of security, risk awareness, and risk management is not adequate. Another is that one collaborator may identify and develop unanticipated applications of the intellectual property, resulting in the two collaborators benefiting unequally from the collaboration. This situation can damage the working relationship between the two organizations. Again, careful writing of a contract between the two firms can address such potential developments.

Inadequate communication between collaborators can doom a project by delaying decisions. Some of the communication between team members may be done through videoconferences and telephoning (including such software tools as GotoMeeting). However, much of the interactions between team members also are done through writing and reading e-mails and instant messaging. One has to use some of the same principles as employed in effective listening but do so in writing. The most important principles include asking open-ended questions and restating what another person wrote in order to clarify understanding. Leaders need to remember that some team members may face special challenges in communicating effectively because English is their second language.

Inadequate reporting procedures or differences in reporting procedures between laboratories can lessen communication effectiveness. For example, one laboratory may use

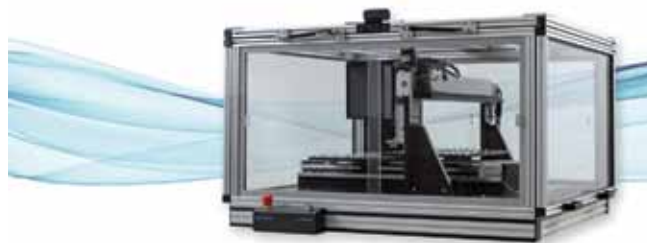
different project management tools or employ different reporting software and report formats than the other. Project leaders should agree on communication protocols at the start of a collaboration to prevent this.

### Cultural differences can delay projects

Cultural differences—whether between countries or between the workplace cultures of the organizations involved—can derail effective collaboration. For example, a major petrochemical company was designing a large project in the Pacific Basin. The project was nearly to the pilot scale demonstration stage when the company decided to transfer project management and delivery from a U.S. laboratory to an Asian one. The Asian laboratory personnel had no input into the original project design and some of the major project decisions. They wanted to reconsider both the project design and previous project decisions. This led to delays, disagreements, and, on the part of the Asian person-

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nel, frustration. Problems also occurred due to cultural differences between the veteran U.S. employees and the very recent graduates staffing the Asian laboratory. These differences were compounded by differences in language and work styles. The complex project quickly began falling behind schedule.

“Some team members may face special challenges in communicating effectively because English is their second language.”

### Wrap-up

Collaborating on R&D projects can be challenging. Many of the issues associated with collaborative projects are more challenging to manage than when a single organization performs all the work associated with a project and does the work in a single laboratory. However, collaborating with other organizations and surmounting these challenges can result in financial rewards greater than those that can be achieved when your organization works alone in a single laboratory.

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*Dr. John K. Borchardt is a consultant and technical writer. He is the author of Career Management for Scientists and Engineers and often writes on career-related subjects. He can be reached at [jkborchardt@hotmail.com](mailto:jkborchardt@hotmail.com).*

## AROUND THE CLOCK LAB SAFETY

by John K. Borchardt

Some service laboratories operate 24 hours a day, 7 days a week. These include chemical plant laboratories, laboratories in other types of production plants, some hospital laboratories, and forensic laboratories. While automated lab instrumentation can reduce the need for lab staff members to actually be present 24/7, often there remains a need for people to be physically present in the lab. Lab members should be sure these people do not work alone and that someone is checking on their safety. Laboratory managers should be aware of what these nighttime and weekend employees are doing while the day shift is at home.

Some companies are increasingly using short, interactive online courses to train employees on safety, ethics, and other matters. These are usually mandatory. These courses often include online examinations. Only when employees successfully pass these examinations are they registered as completing the courses. Lab managers should make sure their staff members complete these courses as required.



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# TALK THE TALK

NEW WAYS OF THINKING ABOUT COMMUNICATION **by Ron Pickett**

A few years ago, I was invited to participate in a focus group. The topic was advertisements for home mortgages. We watched a number of advertisements, evaluated them, and then compared them. To me it was a silly exercise. If I was not interested in a mortgage, then the content and style were not at all important to me. I told this to the consultant who was running the focus group—and he almost kicked me out.

You may have seen a number of articles on communication in *Lab Manager Magazine* (see references below) and wonder why another. Each of us approaches the topic in a different way, from a different point of view, and from a different experience base—you may find one author's views more helpful to you than another's. Further, the timing may be right; you may be experiencing communication problems with your group right now, and that may draw your interest to this topic. You may be interested in a mortgage!

I see communication problems around me constantly! Two people talking about two completely different things and thinking they are communicating. People not paying attention to what the other person is saying—simply buying time to say what they want to say. People trying to influence or impress someone else with their brilliance, and people hoping to influence another person and having no idea how to make their point—and none of these situations results in effective communication.

## Be on the same page

My first suggestion: Make sure you are talking about the same thing and with the same level of intensity! Take time to clarify the topic, using a “Let’s review the status . . .” approach. If you are vitally interested in what you are attempting to communicate and the other(s) are disinterested, raise their level of interest if you hope to have any chance of being understood. Before you can make your point, spend more time than you may think necessary to provide background, rationale, history, consequences, etc. After you have laid the groundwork, the chance of your message getting through goes up tremendously. Stand back from the conversation and watch what’s happening. Are you on the same topic? Are you approximately equally involved—invested? What would you do or say as a third party to get this back on track?

## Listening

Second: Listen appropriately. That may sound strange, but here’s an illustration: have you ever tried to chat, simply hold a friendly discussion with someone who is acting like an investigative journalist? It’s really tough, you are in a mood to discuss a topic that you find interesting and personal, and they probe and look for expanded information. You are pummeled with questions for clarification, references, study statistics, and more while the story you



"A manager must have a strong set of listening skills, and you need to be able to use these skills effortlessly."

want to tell is about your pastime hobby, which is making jewelry! These conversations seldom progress very far—you and the antagonist are in two different places. (I'm surprised at myself for talking about too much listening, but I have seen examples recently of people applying good listening skills to the extreme and poisoning a conversation.) Learn to differentiate between a setting in which strong listening skills are necessary, paying really close attention, attending (using verbal and nonverbal clues that you are interested and understanding), restatement (repeating what the person just said in a slightly different way for clarification and empathy), and a setting in which too much attention can spoil a connection.

Certainly you as a manager must have a strong set of listening skills, and you need to be able to use these skills effortlessly, but "appropriate use" is my message here. Just because you have a hammer, don't see everything as a nail, as we used to say.

### What is their preferred method of communication?

Third: Identify the most effective methods of communication for important people in your life and tailor your style and methods to match the person with whom you are communicating. Yes, it is your responsibility! This is of greatest importance in communicating with your superiors. How does your boss like to be given information? No, that's not a rhetorical question. How does your current boss prefer to be told something? Is she more comfortable with written memos? Does he prefer a briefing in person? Are they predominantly visual or oral? Is she better at absorbing information over a couple of days before being expected to respond or make a decision? Or are snap decisions his trademark? Does she like to be given several alternative suggestions and

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be expected to select from among these? Or does he like to come up with the answer? Is an informal or formal approach more likely to meet the needs of your boss? From my experience this knowledge can be gained only by trying different methods over time. You can ask, and should, but don't expect people to be able to identify their preferred method accurately. So try some different approaches and see what works best.

**“Tailor your style and methods to match the person with whom you are communicating.”**

Should you spend this time and effort on the people who work with you? That depends. If communication is quick and effective and leads to few misunderstandings and glitches—keep doing what you are doing. However, if you find mistakes and confusion becoming common, take a look at how you are communicating and think about making some changes—using more memos or meetings, explaining in greater detail, or asking more questions for clarification.

### **“Words with friends”**

That's the name of a popular app that looks a lot like Scrabble, and it sometimes applies in some lab settings. Especially in small labs, but in other settings as well, the issue of communicating uncomfortable topics sometimes arises. You work hard to develop and maintain a close, collegial relationship with your best people, and now you have to correct their behavior, provide specific direction, or tell them some really bad news. How do you do it?

There are really no good short answers to this situation, but here are some things that may be helpful. Try to avoid the situation in the first place. You may have attended grad school together, your families may be close, you may have spent 10 years working collaboratively on a research project, you may have been leaning heavily on him or her during the years you were learning how to be an effective manager, you may have been in competition for the supervisory position you now have—and now you have to talk seriously about some bad habits or a behavior you have noticed that is having a negative impact on your group.

What do you do? First, be cautious in forming and nurturing your relationships; try to be clear about the personal side and the professional side. Ease away from relationships that seem to be testing or crossing the boundaries, relationships where the closeness is starting to be “used.” Keep clear about these distinct dimensions: the personal and the professional. Monitor your relations with key staff members and test in your mind if the closeness is getting in the way of your carrying out the responsibilities of your job. No, you aren't in the military and the likelihood of your having to order someone into a very dangerous situation is vanishingly slight, but that doesn't lessen the importance of maintaining a degree of separation between personal and professional. If the other person can't handle this dichotomy, you need to seriously consider breaking off the personal side.

When you need to have a serious conversation, start by being clear that this is a work issue and clearly separate what you are going to discuss from the personal side of your relationship. With some people you can actually use the personal relationship to gain

agreement and a commitment to change. With others, the person may try to use the personal relationship to duck the issue. If that happens, don't be afraid to identify what you see going on and challenge the other person. Close the conversation by describing the value of the personal side and a commitment to maintain both parts of the relationship.

Building the work-friend relationship and making it work is one of the most difficult issues managers face. It begins when you first take on the responsibilities of leadership and it never goes away.

### In summary:

- Be clear about the subject and your expectations.
- Listen appropriately—not too attentively and not too loosely.
- Match other people's preferred communication styles.
- Be very aware of the personal and professional elements of your relationships.

“[Maintain] a degree of separation between personal and professional.”

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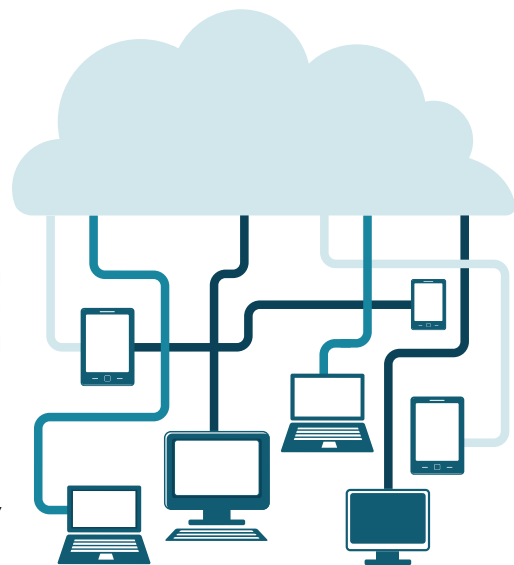


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# COMPETITIVE ADVANTAGE

**HOW BIG DATA COLLABORATION CAN REMOVE BOUNDARIES BETWEEN “INSIDE” AND “OUTSIDE” AN ORGANIZATION** by Mike Weaver



Networking applications and the cloud have made it easier for individuals and businesses to collaborate. Meanwhile, the digitization of data [big data] has made it possible to identify collaboration partners and subsequently execute the outsourcing and offshoring of services and commodities as never before. Earlier, I wrote about laboratories being on cloud nine and made the case for competitive advantage through collaboration and the analysis of your company's raw data.

## Collaboration of the fittest

Nature can teach us a lot about collaboration. In some instances species that collaborate with partners stand a better chance of survival. In nature collaboration is used to survive a harsh world or to compete for scarce resources. There are numerous examples where collaboration is far more important than competition in the game of survival. Ants and the bullhorn tree have created an intricate interdependency for the benefit of both.<sup>1</sup> Lions sometimes hunt in groups to catch larger prey than they could have caught alone. Zebras like to stay close to giraffe herds to use the giraffes' long necks as an advantage. If the giraffes run, so do the zebras. Zebras have outsourced the lookout function to giraffes because they have the optimal vantage point of the surrounding area.



Could this collaboration phenomenon also be true in business? There are examples of businesses reflecting nature's collaboration with cross-selling initiatives, such as credit cards offering deals from other vendors. This has been done for quite a while. However, to better understand corporate collaboration, let's define the reason there are boundaries between corporations in the first place.

## Cost of business

In a free market, the need for a product or service will be benchmarked against supplier competition for the best possible price. Why then would a company not look to this open market to fulfill all its needs instead of hiring and building its internal business? Why worry about the training, legal implications, and benefit structures that come with the organization of individuals internal to your business? Why not let a freelancer do the work and skip the insincere charade of discussing employee development plans and tedious HR policies altogether? It's uncomfortable for everyone, and we all know that no one is getting a promotion here.

The answer is transactional costs.<sup>2</sup> The cost of doing business solely with the “outside” results in a pricing mechanism and other costs that make it too expensive to tender every task to the market. Pricing costs are the costs expended to find the correct service, to negotiate a price, and to buy and control the service. All this takes effort, and it makes the price of the service or project more expensive than if it were procured internally. Think about it this way: If your laboratory hired a contract firm to calibrate your instruments, the process of finding a suitable firm, negotiating a price, and then controlling the service for

each calibration would be outrageous. It would be much more cost-effective to hire qualified staff to conduct the calibrations as they are needed. In reality, you could hire a calibration firm for longer periods, cutting the frequency of negotiation and planning, but until your organization becomes quite large and requires many calibrations, the task would be best done internally. The larger an organization, the more costly internal operations and coordination of the activities become, thus shifting the balance back toward the free market. So maybe not all is lost in your upcoming annual review discussions with employees, as you can remind them that a raise in compensation would just shift the balance toward the free market, thereby eliminating their positions.

**“A well-focused collaboration strategy can lower direct costs, but there are other advantages as well.”**

### **The granular cloud**

Getting back to the advantages of collaboration, it should be noted that if the transactional costs can be attenuated, then it would make good economic sense to begin more frequently asking some questions such as “Why are we a company?” and “Should we do this task?” Technology is lowering the transactional costs of doing business, and the cloud makes a great case for offering a wide array of services that were not available before. Collaboration is the essence of an organization and has traditionally meant group meetings and smaller teams. Cloud computing and collaboration offer a unique combination of putting the user back in control, removing boundaries between “inside” and “outside.”

### **What's your collaboration strategy?**

Does your organization have a strategy for collaboration? Is it driven by a business need or technological capability? These questions can be key to the survival of your business in the future. As discussed thus far, a well-focused collaboration strategy can lower direct costs, but there are other advantages as well. Competitive advantages such as the retention and attraction of talent, finding solutions to complex issues, and better connections with your customers are just a few.

### **Collaboration and talent**

Assemble a team of recent graduates for a project and within minutes they will be exchanging Skype IDs and setting up a collaboration medium in Google Docs, Skitch, or SharePoint. The team's goals and deliverables are clearly defined, but how they carry out the project is relatively open and left to their discretion. Some will work late at night, others early in the morning, and some on weekends. The expectations of these “social, digital natives” put pressure on organizations looking to attract the best talent. When support is not available in the company, these employees will look beyond to the cloud for answers. If these items are off-limits, they will move on to a company where they can work the way they like because collaboration and networking are a natural way of getting things done. In fact, recent examples point to how collaboration is not just a means for procuring deliverables but sometimes the best way to find solutions to complex problems.

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### Crowdsourcing issues

Your organization has an issue that is holding it back from a major competitive advantage. To solve this issue internally would take too much time, money, or both. Enter cloud crowdsourcing to the rescue. *Wired's* contributing editor Jeff Howe first coined the term crowdsourcing in 2006.<sup>3</sup> By his definition it can be described as a distributed problem-solving method and production model. Usually the problems are broadcast to an unknown group of solvers and an open call is given for solution. Users, known as the crowd, typically form into online communities, and the crowd submits solutions. The crowd then participates in sorting through the solutions, finding the best ones. The best solutions are then owned by the entity that broadcast the problem, called the crowdsourcer, and the winning individuals in the crowd are usually rewarded.

A recent example of the success of crowdsourcing has to do with a small company, JetPac, and their need to develop a photo algorithm that found the best quality photos.<sup>4</sup> Instead of putting their limited internal resources on the issue, they offered a \$5,000 prize on a crowdsourcing site (Kaggle, in this example) to the individual or organization with the best solution. In a relatively short time they had multiple solutions that worked extremely well. So well, in fact, that they were able to leverage the solution within their existing business to create hundreds of thousands of dollars in additional business value. That's quite a return on investment.

If your laboratory or business operation doesn't require complex algorithms to make its business better, that's not a problem. All kinds of innovated solutions can be crowdsourced. For example, Procter & Gamble has achieved the objective of increasing external development of new products from 20 to 35 percent by using crowdsourcing networks as a way of reaching independent talent. Crowdsourcing firms for companies in regulated industries exist too, such as Innocentive. Established by Eli Lilly & Co. but open to anyone to use, it is a network of 80,000 independent, self-selected problem solvers in 173 countries.

So the use of crowdsourcing is as far-reaching as the cloud itself. Could your business benefit from greater product usage and awareness by using the cloud to publicize your crowdsourcing challenge to the right individuals?

### Connecting with the customer

The Industrial Revolution caused the demand and supply model to shift in favor of the producers. Machinery enabled organizations to serve vast numbers of consumers simultaneously. These organizations were cut off from their end customers and from direct feedback. Corporations assumed that they knew best, as they were fed information only through middle sellers who may not have had proper incentive or the ability to report customer satisfaction back to the producer to improve output.

### Cloud collaboration

The cloud can foster customer engagement in the same way it can foster employee retention, engage in crowdsourcing, and lower transactional costs in outsourcing. It breaks barriers and opens a new stream of communication and relationship data that levels the playing field for those open to adaptation and collaboration.

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# WHAT IS WORKPLACE BULLYING?

By Valerie Cade

While the term “bullying” is often associated with children, it is very common to see the same type of behavior in a work setting. Here are some startling facts about workplace bullying that you may not know:

- The vast majority of all bullies are bosses or people who think they are your boss but they are not.
- Only a third of the people bullied confront the bully.

## What, then, is workplace bullying?

Workplace bullying is **deliberate, disrespectful, repeated behavior** intended to harm the target, by one or more people toward another for the bully’s gratification.

**First**, the behavior that the bully uses is deliberate. The bully intends to hurt

his or her target and is very focused, repeatedly attacking the **same person**. It is pre-meditated and designed. So yes, the bully is aware of his/her behavior and it’s not accidental.

**Second**, the behavior consists of disrespectful actions, such as humiliation, intimidation and undermining. Most adult bullying is done in private or by passive-aggressive means so as to not alert anyone that this might be “out of line.”

In addition, if someone behaves disrespectfully to “everyone,” then this is not considered bullying, but rather a style issue.

Since passive aggressive actions are harder to detect here are some examples:

- **Repeatedly** scheduling surprise meetings to catch the target off-base.
- **Repeatedly** ignoring the target in a meeting, while acknowledging others.
- **Repeatedly** playing the target off against one or more other employees.

**Thirdly**, you’ll see from the points above that we define bullying behavior as being **repeated**. Here is a tip: The repeated nature toward one target and not toward others tells us the bully has the capability to treat others more respectfully.

It is important to note that not all negative workplace behavior is bullying.

Random actions, although hurtful, are not necessarily bullying but would be more appropriately labeled as difficult behavior.

In addition, if someone behaves disrespectfully to “everyone,” then this is not considered bullying, but rather a style issue.

In these two scenarios, the person is attempting to have **their own needs** met, rather than specifically and deliberately targeting another person at the other person’s expense, which is bullying.

**A fourth note:** You will notice that we use the word target rather than victim. Victim implies that the person being bullied is less powerful than the bully. We believe that the bully’s target has power—they just may not know how to use it...yet.

## LABCAST

Be sure to attend Valerie Cade’s Lab Manager Academy webinar, “Bully-Free in YOUR Lab!” on Wednesday, October 3rd, or afterwards at [www.labmanager.com/bully-free](http://www.labmanager.com/bully-free) to watch the archived video.

A **fifth** element in the definition is the bully's gratification—what he or she gains from his or her bullying behavior. Bullies are envious of their targets and need to convince themselves regularly that they are more powerful in order to prop up their wobbly self-image.

**Finally**, do you think bullies suffer from low self-esteem? Most answer yes. The real answer is no, bullies do not suffer from low self esteem. Self esteem is the ability to believe one is deserving of happiness. The bully in fact believes and feels entitled to happiness, at the expense of others.

Why do we need to know if a situation is workplace bullying? Because of the exclusion factor. When one person is being treated at such a disadvantage compared to others it is the highest form of breaking one's spirit, will, and motivation. Knowing how to assess this properly can save individuals' lives, lab performance, and even families and communities.

Know this: Bullying says a lot more about the bully than it does about the target. For targets, know you are not alone

and that there can be a different future. If you are unsure if the behavior you are experiencing is bullying, become as aware as you can in order to 'name it' as handling a bully is actually 180 degrees different than handling traditional conflict resolution.

*Valerie Cade, CSP is a workplace bullying expert, speaker and author of "Bully Free at Work: What You Can Do to Stop Workplace Bullying Now!" which has been distributed in over 100 countries worldwide. For presentations and consulting on workplace bullying prevention and respectful workplace implementation, go to <http://www.bullyfreeatwork.com>. Valerie can be reached at [val@BullyFreeAtWork.com](mailto:val@BullyFreeAtWork.com) or by phone at 403-508-0678.*

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# PUTTING SOCIAL MEDIA TO WORK IN THE LAB

By Mark Lanfear



I've talked at great length in this column about the science industry transforming so much in the past few years that the concept of knowledge sharing—and in turn being much more open about your work—isn't really a foreign concept anymore. In fact, being connected with colleagues all over the world with regard to your lab work or any other project your organization is working on isn't just about taking an innovative approach when it comes to the scientific workplace. From a business standpoint, embracing the virtual reality of the workplace of the future and the social media tools that allow us to keep that connectivity has in some respects become a necessity. After all, these days we are all forced to do more with less, make the most of our resources, and push out quality products on time and on budget. Social media tools are starting to allow us to do that with much more ease in the life sciences workplace.

Yet you may think that this concept doesn't have much pull in the life sciences. It's worth looking at some numbers to put this trend in perspective—and to take a peek at what science colleagues around the globe actually think about mobile and social media technology at work. Data recently gathered in a worldwide survey of the workplace suggests that the trend is much more important than you might think.

For the 2012 Kelly Global Workforce Index™, nearly 170,000 people around the world and working in all industries answered key questions about their thoughts on the workplace. A little more than 3,000 of these respondents work in the life sciences. They answered the same questions as everyone else, and several of those questions dealt with their thoughts on today's mobile technology capabilities.

**"The social media tools that allow us to keep that connectivity [have] in some respects become a necessity."**

A majority of these 3,000 respondents in the life sciences (about 65 percent) did not feel that using social networking tools at work negatively impacts workplace productivity. A majority (89 percent) have never been told to stop using social media at work. Forty-three percent of respondents feel pressure not from their employers but from themselves to stay connected with their work at all times. And 51 percent strongly agree that using mobile technology of all kinds has improved their work efficiency and productivity.

If anything, these numbers show that mobile technology is being embraced by those who work in the life sciences, and managers would be wise to recognize—and capitalize on—the social media trend to make it work for business goals.

But how do you do this? Well, it can be as complicated or as uncomplicated as you want it to be. Social networking as we know it today is really at its heart just the modern version of connecting and communicating in a social setting with like-minded people or people you want to get to know. Except that today social media is the true vehicle for social networking, as opposed to, say, networking at an annual conference or a casual after-work meeting.

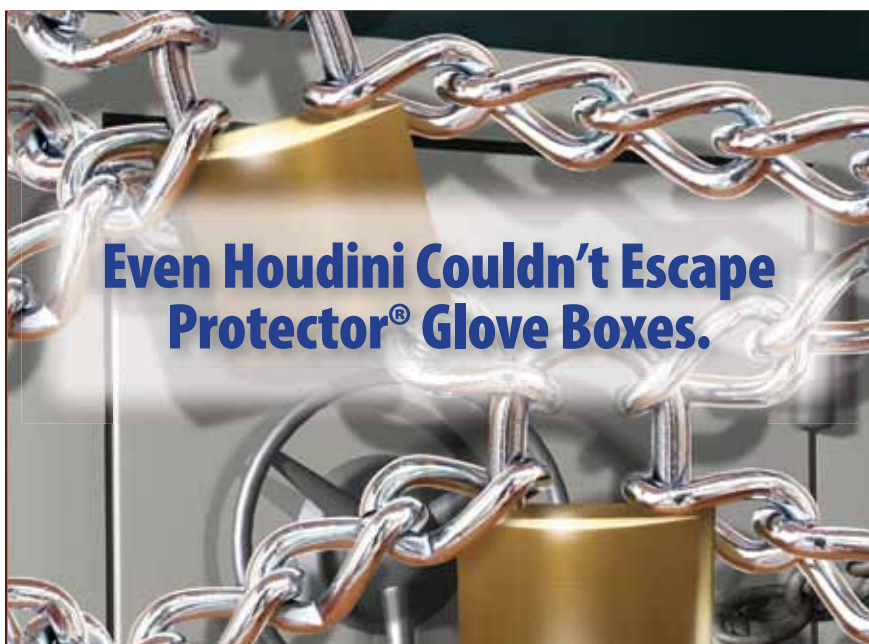
So much of what we do today on the job and so much of the knowledge we acquire, after all, comes from the virtual world. It could come from someone in the next city or a continent away. This is why social media sites for the sciences, such as ResearchGate.net, are gaining traction. ResearchGate.net easily connects scientists, allowing them to answer questions from peers, share research papers, and find collaborators for future projects. Essentially it is a mash-up of Facebook®, Twitter®, and LinkedIn® for the science world, where scientists can share their photos and profiles as well as their work with colleagues around the globe. Since its

inception in early 2011, membership has grown to more than 1.3 million users, and about 1 million publications have been shared so far in a notable example of traditional scientific journals being bypassed in favor of the virtualization and easy accessibility of critical scientific information.

Many other science-centered social media sites are beginning to take shape. As a lab manager, perhaps your role is simply allowing these sites to be used regularly by employees. Or maybe you could explore a systematic way to invite collaboration from colleagues all over the world using these social media tools as a catalyst. You could even hire a social media consultant or workforce partner who could help you optimize your options and even help you recruit the best talent using the latest social media platforms.

However your business ends up using social media in the sciences, just know that the trend is not likely to wane. If you can get a grip on it now and explore how you can use it to your advantage, you'll already be well on your way to succeeding in the scientific workplace of the future.

*Mark Lanfear is a global practice leader for the Life Science vertical at Kelly Services, a leader in providing workforce solutions. Mark has overseen teams of scientific professionals around the world for almost two decades. He has held leadership roles with two of the top three scientific workforce solution companies and three of the world's top 20 Biopharmaceutical corporations. In addition, he is a feature speaker and writer at many of the Life Science's industry conferences, universities and periodicals.*



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# BUILDING TRANSPARENCY—A BOTTOM-UP VIEW

**HOW STRATEGICALLY INTEGRATING INFORMATICS TOOLS ACROSS A DRUG DISCOVERY WORKFLOW CAN IMPROVE TRANSPARENCY, TRUST AND PRODUCTIVITY** by Mark J. Hayward\*, Chi Zhang, Romel Campbell, and Qing Ping Han

*This is Part II of a two-part series.*

The goal of an informatics project implemented in the drug discovery analytical group at Lundbeck Research was to gain efficiencies and productivity by increasing transparency, improving data quality, and building trust. A willingness to embrace transparency is critical to the success of an organization, and an open environment in which data are readily shared and reviewed and in which the quality of the science is of utmost importance nurtures a corporate culture built on transparency and trust. Part I of this article (*Lab Manager Magazine*, June 2012, “Building Transparency—A Top-Down View”) presented the underlying principles and main objectives of this project. Part II describes the selection and implementation of software tools, their integration into an efficient and effective informatics network, and the outcomes and lessons learned.

The overall objective of this project was to gain efficiency by linking analytical data to chemistry and biology via electronic laboratory notebook (ELN) systems while they were in the process of being deployed. The vision was to create bidirectional pipelines for analytical data to flow to/from the ELN and proprietary corporate compound/pharmacology databases and to have these pipelines in place before deployment of the ELN. The project also provided an opportunity to improve data organization, workflow efficiency, and transparency.

## Real-world implementation

The drug discovery analytical group at Lundbeck employs multiple tools and methods to determine the composition, structure, and purity of drug compounds; measure physico-chemical/ADME properties; perform mechanistic and other complex bioanalyses; and evalu-

ate the solubility, stability, and other characteristics of drug compounds in various formulations. These functions encompass a broad range of analytical techniques, including liquid chromatography/mass spectrometry (LC-MS), supercritical fluid chromatography (SFC)/MS, gas chromatography (GC)/MS, MS-MS, automated pH ( $pK_a$ )/Karl Fischer (water content) titration, and nuclear magnetic resonance (NMR). At Lundbeck, these analytical systems feed data into three main informatics platforms: Empower, used mainly for quantitative analysis and LC peak integration; MassLynx, for applications related to mass spectrometry; and NuGenesis® Scientific Data Management System (SDMS), which makes data readily viewable and was the conduit for transferring data from multiple instruments to the ELN.

## Using only native software capabilities

Medicinal chemists and compound management groups use LC-MS to determine and verify the molecular weight and purity of compounds. The use of dual UV detectors improves the overall quality of science; it increases the dynamic range and reduces the need to adjust sample concentration. The results from both detectors are depicted on one screen for ease of comparison (Figure 1). OpenLynx, used in Open Access (OA) mode, automatically prints the chromatographs and accompanying computational analyses to SDMS. A laboratory using OA should be fully integrated in terms of capabilities, location, and electronic delivery of results, as is the case for all chemistry-related data at Lundbeck, regardless of hardware/software source. All processed data are printed into SDMS and available for immediate viewing. Ongoing support for maintenance of instruments and training as well as ongoing communication are essential.



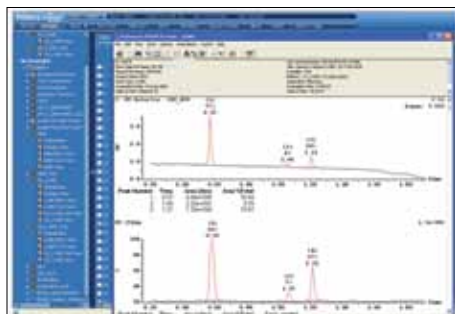


Figure 1. Immediate visualization of Open Access LC-MS data via SDMS Vision.

Trust within a drug discovery group is especially critical with regard to the purification of experimental compounds. If a medicinal chemist, instead of a purification expert, insists on performing the purification, it can cost as much as ten-fold more in scientist time. Figure 2 illustrates a purification run in which an evaporative light-scattering detector (ELSD) is used to quantify the mass of a compound being collected and in which a UV detector monitors the waste stream. The purification data generated in FractionLynx are automatically printed to the SDMS in real time, injection by injection; in this way, the medicinal chemist can watch the purification in progress, know when it is completed, and see that none of the target compound is lost. The report generated records the mass of the target peak on completion of the purification and identifies the rack location of the fraction containing the compound. This transparency has been pivotal in establishing the crucial trust that must exist between medicinal chemists and purification scientists.



Figure 2. Immediate visualization of LC-MS-based purification data: the combination of quality of science in the experimental design and complete transparency of the data builds strong trust, which has high positive impact on speed and efficiency.

For bioanalyses that require difficult separations (including chiral compounds) using LC-MS-MS and SFC-MS-MS, the analytical group uses MassLynx for data acquisition and instrument control. The data are automatically converted using the Waters Data Converter, and Empower performs automated peak integration, determination of detailed system suitability parameters, and report generation, enabling rapid evaluation of data quality and assessment of assay performance (Figure 3). Real-time data acquisition and reporting allow analysts to monitor the integrity of the separations and to identify potential deterioration as a function of time. The data can provide evidence that assay performance is declining well before it would be evident to the naked eye.

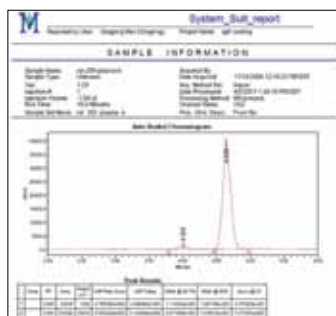


Figure 3. Immediate visualization of SFC-MS-MS bioanalytical data, including system suitability parameters to monitor and ensure the highest-quality data is generated.

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### Adding customized software capabilities

Customization of the software and links to other laboratory systems such as sample/pharmacology databases or ELN can substantially improve the workflow efficiency. Many of these desirable features are not currently available in native software. Although they are beginning to gain attention from software vendors, it could be years before they arrive as off-the-shelf products. They can be realized sooner by execution of targeted mini-projects aimed at improving workflow efficiency. For example, by linking data acquisition software to proprietary databases, it is possible to prepare and import sample lists for instruments simply by reading the barcodes on samples. This streamlines assay sample processing. Automatic electronic updates of the sample identification lists also safeguard experimental accuracy against human entry errors.

These capabilities are especially important when performing universal processing of all compounds to assess their ADME properties and when processing selected subsets of compounds to run against different project-specific assays. It is not efficient to process ADME assays on a project-by-project basis. Instead of processing ADME assays on bar-coded tubes separated into racks by project, racks are backfilled to perform these assays. The tube bar codes are then rescanned to generate an updated sample list generated from the sample database, automatically creating instrument analysis lists using an add-in present in Empower. Each sample rack can also be assigned to a specific instrument and undergo automatic processing according to a menu of assay templates. The same is true for MassLynx, OpenLynx, and FractionLynx, as shown in Figure 4.

Once assay data are recorded they need to be processed (peaks located and integrated) and converted into assay readout values. For truly high throughput assay output, customized tools to process and calcu-



Figure 4. Scanning sample bar codes to automatically generate sample analysis (assay) lists for any instrument type (MassLynx shown).

late values and create assay output sheets for upload to pharmacology databases can enhance productivity. Internal use of the development tool kit for native analytical software is particularly useful. Tools can be created that flag specific analyses with peak integration/selection issues, facilitate reprocessing and recalculation of results, and upload assay values, all within one application. Figure 5 depicts an example for Empower used to process ADME assay results. This tool allows routine processing of >6,000 chromatograms per month, fully profiling >600 compounds in seven assays, with consistent two-day turnaround performed by 0.5 FTE.



Figure 5. Flagging specific analyses with peak integration/selection issues, reprocessing raw data, recalculation of assay results, and upload assay values—all within one custom Empower SDK application.

“Trust within a drug discovery group is especially critical with regard to the purification of experimental compounds.”

Medicinal chemists can more easily interpret the mass spectral component of OA LC-MS data generated for reaction monitoring using a customized program designed to intercept the data in OpenLynx. The program processes the MS data without printing it, considers all of the peaks in each MS spectrum, and identifies the molecular weight indicated in each spectrum using all the adduct peaks. The molecular weight, calculated based on both the positive and negative ion mass spectra, is inserted into the OpenLynx report at the top of each +/- spectra pair (Figure 6) and printed to SDMS. This approach adds value to the data because the medicinal chemist immediately knows the molecular



weight associated with each chromatographic peak and can effectively utilize the OA LC/MS resources without advanced knowledge of mass spectral interpretation.

Time is critical when performing reaction monitoring and making real-time decisions. Emailing data to the

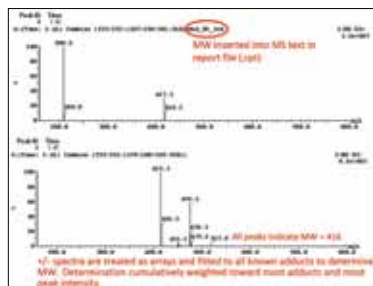


Figure 6. Automated mass spectral interpretation uses all peaks in positive and negative ion spectra to determine molecular weight for each chromatographic peak and inserts the information into the report.

“Customization of the software and links to other laboratory systems ... can substantially improve the workflow efficiency.”

scientist saves time by allowing the data to find the scientist. Lundbeck collaborated with Waters to create an automatic email tool for SDMS. The email contains all text fields captured by SDMS and a pdf of the full data report with the batch ID (lab notebook # or compound #) as the file name. The scientist can simply drag and drop the pdf into an ELN. At Lundbeck, the drag-and-drop feature is used approximately 30,000 times/year, at a savings of about one minute/use compared with the usual file import approach. This equates to an organization-wide savings of about 0.25 FTE/year, which recovered the initial cost of all SDMS components in the first year.

A summary report containing all the data generated can help the project team

review hit compounds across screening assays. For example, a single Excel file might include molecular weight, purity, and concentration data, together with compound identification, chemical structures, and formulas, as well as comments on the results, such as the presence of impurities or isomers. The summary report may also include an SDMS (or pdf) link, allowing users to click and view the analytical data (chromatograms and spectra) for each compound (Figure 7).

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Figure 7. Combining the tools described here to produce highly effective results summary sheets.

### Conclusions and key lessons learned

In the end, all the defined project objectives were achieved (prior to ELN deployment), as were various opportunistic objectives that were added as the project progressed and generated additional efficiencies. Achieving trust was the ultimate goal, and the results suggest that over the course of a year of total transparency, in addition to ongoing consistent and efficient delivery of high-quality results, output from the same full-time employees (FTEs) can be increased by greater than three-fold. The goals achieved and gains realized as a result of this project support the value of informatics as a powerful tool for promoting openness, competence, and efficiency in the research setting. In our experience, this results in much greater trust and collaboration, both crucial attributes of an optimal R&D environment.

“Greater trust and collaboration [are] both crucial attributes of an optimal R&D environment.”

Key project management lessons learned contributed to its success: break the project into small pieces and working groups, focusing first on the most fundamental pieces (in this case, organizational ELN efficiency) and do them well (including customization to the actual optimal workflow); use a balance of internal and external resources to achieve execution efficiency; set incremental milestones to monitor and demonstrate progress; minimize the number of decision makers aiming for execution quality and efficiency; and focus on total transparency and the most efficient use of scientists' time as the two main priorities of project decisions to maximize the positive impact of integrating informatics solutions.

Lead author **Mark J. Hayward**, Principal at Active Ingredient Technologies, can be reached at [Mbay01@ptd.net](mailto:Mbay01@ptd.net) or by phone at 201-628-5831.

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# REPAIR, MAINTENANCE, AND CALIBRATION, OH MY!

**DESIGNING THE MOST COST-EFFECTIVE AND EFFICIENT INSTRUMENT SERVICE PROGRAM REQUIRES CAREFUL CONSIDERATION** by Mike Brown

Just as instrument technology evolves to meet the changing needs of research, so does instrument maintenance evolve as lab managers seek the optimal balance of risk, quality, and cost. Four instrument service models are available, along with a fifth that is a blend of the first four:

- In-house Metrology Model
- Service Consolidator Model
- Independent Service Organization Model
- Original Equipment Manufacturer Service Model
- Integrated Service Delivery Model

Each of these models offers advantages and drawbacks, and a clear understanding of how they relate to a particular lab or network of labs is vital to achieving optimal results.

Every experienced lab manager knows the considerable amount of time required to select and manage contracts for repair, maintenance, calibration, and compliance service for key equipment. Instrument maintenance also ranks right up there with personnel costs as one of the biggest budget items for most labs. While commercial labs are facing increasing pressure to control these costs,

service requirements must be assessed holistically—looking beyond the asset list to critical factors such as position in process and how each instrument's downtime affects lab productivity.

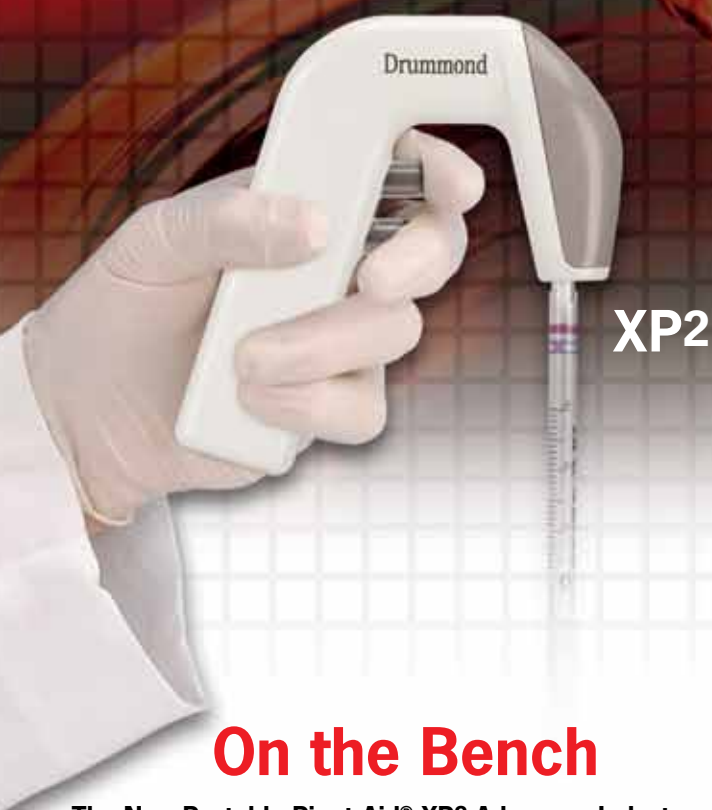
Imagine this scenario: You manage a lab that has ten liquid chromatography systems, two LC-MS systems, and a full complement of ancillary equipment such as pH meters, centrifuges, and micro pipettes to support your staff of three analysts. You're the third manager in ten years and, as the lab grew, the equipment vendor changed with each manager. In midyear it's smooth sailing. When it's time to renew contracts, however, your personal productivity comes to a grinding halt as budgeting and negotiating contracts for each type of equipment dominate your work life.

If this sounds familiar, you're not alone. Most labs employ a wide variety of analytical techniques (LC, GC, LC-MS, NMR, etc.) from several vendors. Therefore, it's not uncommon for lab managers to spend a large amount of time directly working on contracts or working with procurement teams to secure service coverage for mission-critical systems. Factors such as technology type, maturity, and the role each instrument plays in the workflow will help point you to the service model that will provide the best cost/benefit ratio.



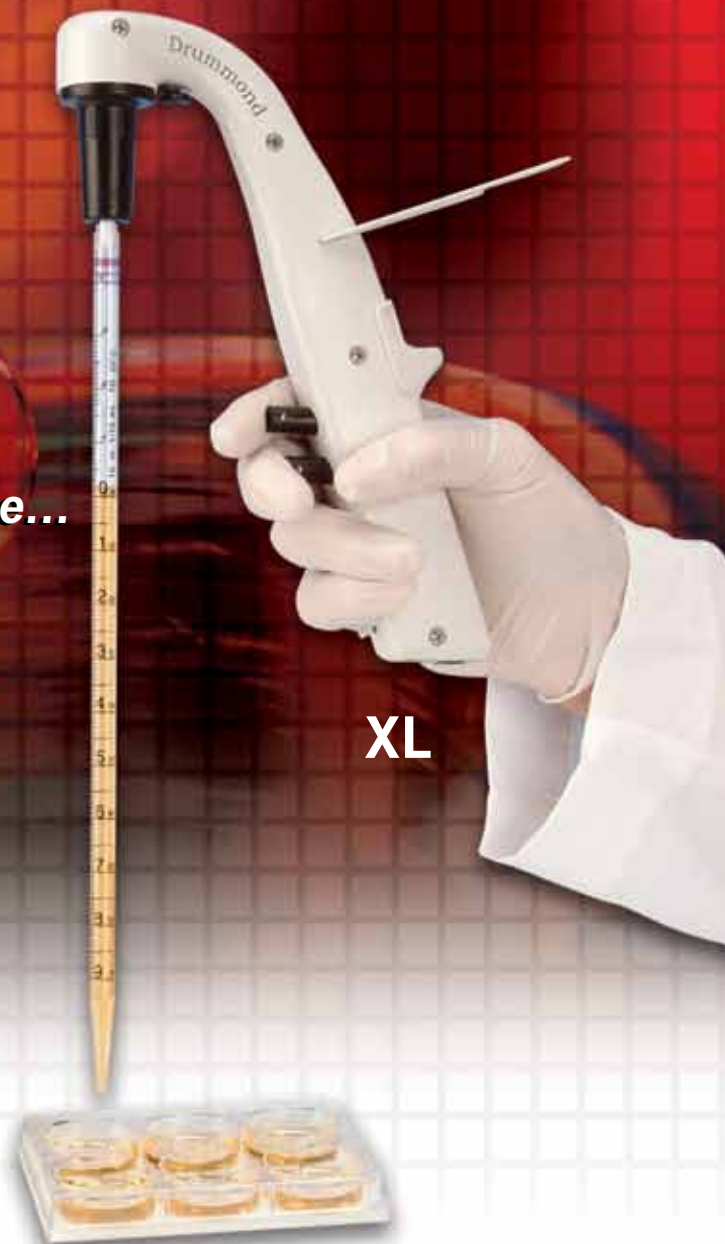
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### In-house Metrology Model

Many organizations have their own teams of engineers to service their mainstream instrumentation. This In-house Metrology Model often offers fast response because the engineers are usually on-site. Another benefit of this approach can be quality: service engineers are often trained by the original equipment manufacturers (OEMs) under “shared care” programs that provide training and certificates suitable for audit purposes. In many cases, shared-care programs also provide in-house engineers with service notes or special training topics to help keep them current. While most in-house metrology teams are focused on scheduled, periodic tasks such as preventive maintenance or calibration, some also repair instruments. While in-house servicing reduces the need for OEM service contracts and associated costs, lab managers also need to consider the real cost of the in-house metrology group, which can be larger than expected.

Depending on the responsibilities and scope of an in-house service team, the fully weighted cost of a headcount must be weighed against the costs of other instrument service models. Many companies find that outsourcing instrument service is the most economical approach when the costs of staffing, training, infrastructure, and parts inventory are considered. The bottom line: Does the rapid response of an in-house team outweigh the costs and the risk burden? The organization must also consider whether instrument service fits within its area of core expertise.

“Technology type, maturity, and the role each instrument plays in the workflow will help point you to the service model that will provide the best cost/benefit ratio.”

### Service Consolidator Model

The Service Consolidator Model is often employed by larger labs or whole sites. You may hear this called the service aggregator model or the service insurance model, as it is based on actuary tables compiled by these service organizations to guide contract purchases. Often the favorite service model of procurement organizations, the Service Consolidator Model, reduces service contract spending by 15 to 25 percent compared to other models. They do this by assessing the customer's asset list against insurance-like actuary tables. By considering the annual failure rate and repair costs for each instrument, the consolidator is able to plan a service program for the site that selectively chooses OEM service contracts for some instruments while calculating the risk of paying for time and materials coverage on others. By reducing the price of the service program, the Service Consolidator Model focuses predominantly on the cost variable in the instrument service value equation.

There can be trade-offs, however, in terms of risk, quality, and convenience. Although service consolidators provide a single point of contact for service-related issues, they typically do not offer any direct instrument service themselves. When a service event is reported to the consolidator, the laboratory must get approval from the consolidator to get a quote from the OEM or other third party for service. Once the quote is received and



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provided to the consolidator, the repair must be approved before the lab can schedule a service engineer to visit. Upon completion of the service event, the consolidator reconciles invoices and can reject those deemed outside the scope of the repair. While the reduction in service spending is attractive to procurement departments, the service process under the Service Consolidator Model can be costly to lab managers in terms of lost productivity. Managers are more involved in service events, often interfacing between OEMs and consolidators, and must typically do initial triage themselves before escorting OEM engineers into their labs. In the event that repair is required on an instrument for which the consolidator did not take a service contract, the impact on lab productivity can be considerable. OEMs typically offer priority responses only to contract customers, so if repairs are required on a time and materials basis, labs may expect delays in the dispatching of service engineers to the site. This is a recipe for tension among the laboratory, the consolidator, and the original equipment manufacturer.

### Independent Service Organization Model

“The Service Consolidator Model focuses predominantly on the cost variable in the instrument service value equation.”

The Independent Service Organization (ISO) Model is based on service delivery through regional organizations that offer support services for a variety of instruments, usually within a limited distance from the corporate office. The greatest attraction of the ISO Model is price, usually the lowest of the service model options. ISOs tend to be small businesses, able to offer lower-priced service because they don't carry the overhead of larger companies. In addition, because ISOs are usually operated and staffed by engineers formerly employed by a variety of OEMs, they can often service more than one vendor's instruments or technology. This helps lab and procurement managers reduce the number of service agreements they deal with by consolidating services with the ISO.

But there are trade-offs with the ISO Model. First, there can be more risk when it comes to quality because ISOs do not have factory support for instrument repair, maintenance, or compliance. While many ISO engineers are factory trained, this training ended when they left their OEM jobs. Some equipment manufacturers are even considering limiting certification to the period an engineer is directly employed by them. The rationale is that only while employed by the OEM does an engineer receive service notes, bug fixes, and new product skills training. This can be critical, especially in a regulated environment.

Another area that deserves scrutiny is services developed directly by each ISO. The degree to which each ISO follows stringent standards varies, so labs are well served by conducting due diligence in this area. Last, due to their size, ISOs are often not a viable solution when service standardization is required across labs at different sites or in different states or countries. Just as size can be an asset when it comes to holding down costs, it can also be a liability when harmonization is needed across multiple locations.

### Original Equipment Manufacturer Service Model

Having each key instrument serviced by its manufacturer falls at the high-quality/low-risk end of the service model spectrum. It also falls at the high-cost/high-administrative-load end. The Original Equipment Manufacturer (OEM) Service Model is based on the premise that labs will receive the highest quality service from the companies that manufactured their systems. While OEM service contracts are often more expensive, they are also considered the lowest-risk service option. Factory-trained and -supported engineers have access to product bulletins, service notes, R&D personnel, service fixes, and warehouses of parts. These strengths, combined with the global infrastructure of many of today's larger instrument suppliers, make the OEM Service Model the frequent choice for highly complex systems or those that are critical to laboratory productivity.

The trade-off for this low-risk, high-quality service is cost. There is more to this cost component than the price of service agreements alone. When considering the OEM Service Model, it's important to look beyond the hard costs such as replacement part prices, contract prices, and labor rates. To clearly assess the viability of this model for your laboratory, you must also address the soft costs associated with contract administration and analyst productivity. Time truly is money, and

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understanding the number of hours spent purchasing and managing service contracts from multiple vendors is critical. Even if you spend as little as 15 minutes discussing contract options with an OEM sales specialist, this time adds up quickly when you do this for 80 or 150+ systems in your laboratory. In addition, analyst productivity is impacted when your service program is spread among several vendors. Analysts must often determine the right service hotline to call, then, under most OEM contracts, do some initial troubleshooting over the phone before an engineer will be dispatched. Our studies have shown that there can be more than 25 process steps involved on the laboratory side from problem reporting to final resolution. There's the initial triage time, the need to escort OEM engineers while on-site, explaining or reproducing the problem, and verifying the repair. These hours represent lost laboratory productivity as well as additional administrative cost.

**“The greatest attraction of the ISO Model is price, usually the lowest of the service model options.”**

If you're responsible for organizing service only for the lab that we described in the scenario at the beginning of this article, then the OEM Service Model and ISO Model are likely to be high on your consideration list. On the other hand, if you're tasked with managing service for larger labs or are participating in a service program design team for your entire site or organization, the Service Consolidator or In-house Metrology Models deserve closer consideration. There's also a fifth model that's emerging in response to customers' evolving needs.

### Integrated Service Delivery Model

A recent trend in the analytical instrument service industry has been for equipment manufacturers to develop service programs that blend aspects of each of the traditional service models according to the requirements of each organization.

These new programs are designed to overcome the administrative burden of managing multiple OEM contracts, while allowing procurement personnel and lab managers to consolidate multiple service contracts into one. The provider of the Integrated Service Delivery (ISD) Model becomes the single point of contact for all instrument service across the laboratory to streamline service processes and make the service program more convenient for lab managers and analysts. ISD can leverage the advantage of the In-house Metrology Model by placing engineers and a parts cache on-site to manage scheduled services as well as to triage instrument service events. This frees lab personnel from the time-consuming involvement in service events while reducing the biggest delay-causing steps in most instrument service events—engineer travel and parts shipping. Because the engineers work for the vendor, the ISD Model can provide the benefit of on-site resources without the weighted costs and infrastructure limitations inherent with the In-house Metrology Model. When compared to traditional



instrument service models, the ISD Model reduces the number of process steps associated with service events and shifts responsibility from analysts to the vendor's on-site resources. Not only does this make the service program more convenient, it also helps lab managers protect analyst productivity by keeping them focused on lab goals rather than participating in instrument service events.

An additional advantage to blended service models is the asset management and reporting functions typically available under these programs. Most of the traditional service models provide very little information about service delivery to lab managers. It's often difficult for managers to track service histories, service costs, or return on services investments. This type of asset management and service reporting is a key feature of today's multivendor service provider programs.

## Conclusion

Choosing the right instrument service program can be a daunting task as you consider all the service factors that drive your service-level requirements. Lab managers must consider all components of the instrument service value equation. When considering any of the traditional service models reviewed here, or even investigating a blended model, it's important to remember that anything that impacts service quality, reliability, or responsiveness can have a direct impact on laboratory efficiency and analyst productivity. And while the price of your service program will always be a consideration, managers must consider the costs and risks of your choices against your company's business goals.

*Mike Brown, services and support program manager, Agilent Technologies Life Sciences and Chemical Analysis.*

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George Weinstock, Ph.D.

# ASK THE EXPERT

## TRENDS IN NEXT-GENERATION SEQUENCING by Tanuja Koppal, Ph.D.

**George Weinstock, Ph.D., professor of Genetics and Molecular Microbiology at Washington University, talks to contributing editor Tanuja Koppal, Ph.D., about what a lab manager can do to stay abreast of changes in the rapidly evolving field of next-generation sequencing. He shares his knowledge and years of experience evaluating new instruments to guide users on what they should look out for as they strive to meet budgets while increasing productivity.**

**Q:** What is your advice to lab managers working in a field such as next-generation sequencing, where everything is so dynamic and always in a state of flux?

**A:** This has to be one of the most difficult fields to be a lab manager in. It is so fast moving, which means that your options are changing all the time in terms of instruments, reagents, and accessories for everything from sample prep up front to downstream data handling. So for the person who has to make decisions in the lab, you're faced with either having to make a large capital layout or to train staff to focus on a particular application. And given that in one to two years there will be new applications that will make what you've just invested in a little bit of a dinosaur, you will constantly be fighting these kinds of issues and decisions.

Some of the more recent next-generation sequencing instruments now have a much smaller price tag than in the past. I think that direction is likely to continue as long as there's competition.

But if you calculate how much it costs to do sequencing, in dollars per base pair, sometimes lower-cost instruments are more expensive to run. The equipment outlay is lower, but the daily operating cost may be higher. So there are a lot of tradeoffs and there's not a simple answer or formula to deal with that. One thing that's most important to avoid is being too influenced by the marketing. Things get "hot" and everybody seems to want to go after those technologies. The traditional experience has been that instruments do eventually reach the goals that are described, but it usually takes considerably longer than you're led to believe.

**Q:** How long does it take for a technology to mature?

**A:** I would say typically for almost every new instrument that we get it takes about 12 months for it to really become stable and become operationally what it was originally described to do. During that 12-month period, one is dealing not only with tweaking the engineering of the instrument itself, such as taking the hinges off

one side of a door and putting them on the other side because they were creating a lot of problems; but more often, it's subtle things to improve the stability and the performance of the machine, such as tweaking a laser or putting in a different kind of pump. And during this period of time, usually the protocols are changing all the time too. It's almost never that the protocol you end up following 12 months after you get an instrument is the same protocol that came with the instrument originally. That means the assays kits change, and you can be in a position of having bought some reagents that are no longer useful. There are a lot of ups and downs during that first year, and so one of the main messages in a field that moves very, very quickly is to keep your eyes and ears open and keep track of everything that's going on. You can be assured that the first time you hear about something it's about a year away from when you really have to start thinking about making your decision to buy.

**Q:** How do you recommend making decisions in terms of buying instruments and reagents?

**A:** The tough decision is when you have instruments that are seemingly going to perform similar tasks. How do you choose which one to get? Assuming that the instruments are equally stable and there are no obvious differences in cost-benefit analysis, I think very

**Dr. George Weinstock, Ph.D.**, is the professor of Genetics and Molecular Microbiology at Washington University. He applies high-throughput DNA sequencing, genome-wide analysis, bioinformatics, and other genetic methods to the study of human, model organisms and microbial genomes. His goal is to employ genetic and genomic thinking to important problems in biology. He led one of the first bacterial genome projects, sequencing *Treponema pallidum*, the causative agent of syphilis. He is now a leader of the Human Microbiome Project, studying the collection of microbes that colonize the human body. The goal of this project is to analyze the genomes of these organisms, characterize the communities they form, and measure how communities change in different health and disease states. Dr. Weinstock was one of the leaders of the Human Genome Project and also the first personal genome project, sequencing Dr. James Watson's genome using next-generation sequencing technology. He was previously co-director of the Human Genome Sequencing Center and professor of Molecular and Human Genetics at Baylor College of Medicine. He received his B.S. degree in biophysics from the University of Michigan and his Ph.D. in microbiology from MIT.

often the decision can rest on very subtle things. On the surface, it may look like both instruments might suffice; but in fact, each type of data is a little different. There are subtle differences in the amount of DNA that's required, how clean it has to be, the types of errors in the sequence that you get may be subtly different for the two different platforms, and so forth. That's really for the investigators you work with to be mindful of and to help you as a lab manager make the right decision. It may turn out that, in fact, certain instruments are going to be significantly more appropriate for a particular application.

**Q: What would you say to users who have not upgraded their sequencing technology in years, either because what they have works or they're not sure when and where to make their investment?**

**A:** It's very difficult to see how using old technology, particularly Sanger technology, is sustainable. It is literally thousands of times more expensive and very limited in terms of the amount of sequencing you can do. So any research institution that wants its researchers to be competitive, in terms of the grants they put in, absolutely has to upgrade. For a new facility that is trying to decide what to do, I still think that there

are many common applications that existing platforms are going to be good for—for at least another two or three years—before they're replaced by something else. If you're a new operation, a great deal of what you need to learn is the fact that these instruments produce so much data. You're usually having to deal with large numbers of different samples, bar-coding them, pooling them together, and running and deconvoluting them. Being able to do proper sample and data management is going to be needed no matter what instrument you invest in and will be translatable into any of the platforms that come out in the future.

**Q: What are you most excited about in terms of the changes in this field?**

**A:** Well, I think it's the reduction in run time. You sacrifice some of the unit cost, the dollars per base pair is a little higher, and also the total amount of data produced is a little lower, but there are many applications that are much better suited to the new lower-cost instruments that have shorter run times. I think that's a very interesting development. If that continues to evolve over the next couple of years and you get a greater range of the amount of data that you can produce and the cost continues to come down but the run time stays short, that will have a big impact on a lot of different applications.

**Q: What has your experience been when working with the vendors? Is this a market where you can go to a vendor and watch a demonstration, or can you actually test-drive the instrument for a few weeks to see whether it's the right fit for you?**

**A:** We've had pretty good luck with vendors, but we're a big customer. So I don't know whether we are given special treatment or not. But often when we get a demo instrument, it's going around to a lot of different sites, so I think all that is possible. The key to taking advantage of that is to have your samples and your applications very well defined and ready to go so that for the limited time that you have an instrument, you can get the most out of it. We've usually found that the vendors are very pleased to work with us because we're very organized. We learn a lot about the instrument by being organized and really putting a lot of effort into it for the time that it's with us.





# CUT TO THE CHASE

**TIPS FOR THE SAFE USE OF UTILITY KNIVES**

by Vince McLeod

Recently we had the unpleasant experience of investigating a gruesome and almost deadly accident. A maintenance worker was removing a cable tie from a package on the loading dock when his pocketknife slipped and punctured his thigh, slicing his femoral artery. If it weren't for his quick-thinking coworkers and the fortunate proximity of the hospital emergency room, the outcome might have been tragic. Luckily compression was applied by coworkers well trained in first aid, and a very short trip to the emergency room saved his life. The sad story here is that this accident was totally preventable.

**“Utility knives are one of the most common tools used in the workplace yet one of the most dangerous, especially in terms of the number and types of injuries produced.”**

The bigger story is that every year there are thousands of these types of accidents in every kind of business across the country. In one published report, Consumer Product Safety Commission statistics indicated that nearly 40 percent of all medically treated injuries due to manual tools in the United States involved knives or retractable blades. These injuries happen due to broken blades, accidental cuts while changing blades, inappropriate use or mishandling of utility knives, and, of course, using the wrong tool for the job.

Research laboratories are no exception when it comes to jobs requiring cutting or the use of sharp blades. I guarantee that your facility has a shipping/receiving area and many

other lab areas where cutting is done without a second thought. So in this issue the Safety Guys offer a few basic tips on safe use of cutting instruments and on preventing accidents and close calls.

## **Let's take a look around**

Have you noticed all the different applications around your facility that require some type of cutting or use of a utility knife? Almost all workers have something to cut during the week. In fact, we bet many carry pocketknives or utility knives in their pockets, on their tool belts, or at arm's reach in a drawer or on the workbench. Some common uses include opening boxes and packages; cutting cartons, string, or strapping material; slicing shrink wrap; opening bags; and general maintenance.

Utility knives are one of the most common tools used in the workplace yet one of the most dangerous, especially in terms of the number and types of injuries produced. We often take these tools for granted, and the dangers of inappropriate cutting equipment and procedures are too frequently overlooked. Let's see if we can cut down on these injuries by taking a look at our cutting tools and some of the newer knives available and then evaluating a few tips on proper cutting techniques.

## **The right tool for the job**

We have all heard the phrase many times—choose the right tool for the job and the job can be done much more quickly and safely. The first rule is to carefully choose the right tool to suit the material you are cutting. There are literally hundreds of knife designs and blade types from which to choose. Let's discuss some of the key features of utility knives and specialty cutting tools now available so we can match the task with the best design and blade. Ask yourself whether a utility knife is the most appropriate tool. Would a pair of scissors or snips do the job better or more safely?

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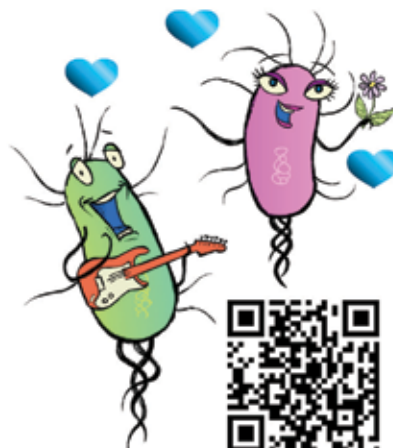
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According to the CPSC, the most prevalent injury is a cut or laceration during blade changes. In order to minimize this risk, look for designs that make changing blades as easy as possible. Use of blunt-tipped blades along with ergonomically designed and ambidextrous handles is also helpful. In-handle blade storage can save time and blade handling, but the key is to make blade changing easy.

Cutters with permanent blade guards can protect employees, as the blade is never exposed. This type of cutter also protects the package contents from damage. For many designs the protective guard acts as a guide to help position the cutter as well.

Another feature widely available in today's utility knives is the spring-back blade mechanism. This design instantly retracts the blade when it loses contact with the material being cut. The spring-back feature can dramatically reduce puncture injuries.

One of the newer design features for utility knives is the bimetal blade. With the bimetal process, two different metals are fused using electron-beam welding. For utility knife blades they are usually a high-carbon steel for sharpness and a flexible spring steel that bends but does not break or

shatter. These bimetal blades can last significantly longer than plain carbon steel blades, with one industry reporting a six-fold increase in time between blade changes.

“According to the CPSC, the most prevalent injury is a cut or laceration during blade changes.”

These blades can help reduce injuries and increase safety in two ways. By staying sharp longer they reduce a worker's natural tendency to press harder as a blade dulls, thus decreasing slips and blade shattering. And since they last longer, they reduce the need for blade changes, lowering the number of injuries accompanying that task.

#### **Tips for safe cutting**

Now that we have chosen the right tool for the task, let's review some rules for safe cutting:

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- Always wear safety glasses. You never know when a blade might shatter or a strap snap loose.
- Wear appropriate protective gloves, especially on the hand that holds the work piece being cut. The proper glove not only protects the hand but also can improve the grip.
- Always cut with a sharp blade. As we mentioned above, a dull blade requires excessive force, increasing the chance of injury.
- Do not make blind cuts. This means clearing the entire length of the cut so nothing unexpected is encountered.
- Make sure you are balanced and your footing is stable and secure. Use a natural cutting movement. This will minimize slips.
- Keep your noncutting hand away from the line of the cut.
- Always pull the knife toward you when cutting on a flat surface. This is a safe, natural movement that provides the best control.
- If using a guide or straightedge, make sure it is securely clamped.
- If the blade begins to tear rather than cut the work, change the blade.
- Do not force a bend or apply side loads to the cutting blade. This is the primary cause of blade breakage.
- Do not use utility knives for prying or other non-cutting tasks.

## Summary

Every workplace requires cutting tasks where utility knives are used. This most common work tool is too often taken for granted and a source of many unnecessary injuries. By observing your various cutting operations and the type of utility knives used, you can ensure that the proper tool is used for the task. Reviewing a few simple rules with employees can help prevent some of the most common and potentially dangerous workplace injuries. Be careful out there.

*Vince McLeod is an industrial hygienist certified by the American Board of Industrial Hygiene and the senior industrial hygienist in the University of Florida's Environmental Health and Safety Division. He has 22 years of occupational health and safety experience at the University of Florida, and he specializes in conducting exposure assessments and health-hazard evaluations for the university's 2,200-plus research laboratories.*

# SAFETY TIP

## PROVIDE ADEQUATE SUPPLIES OF PERSONAL PROTECTIVE EQUIPMENT - SAFETY GLASSES, GOGGLES, FACE SHIELDS, GLOVES, LAB COATS, AND BENCHTOP SHIELDS

By James. A. Kaufman

Employers are responsible for ensuring that personal protective equipment (PPE) is available. Employers are also responsible for ensuring that employees are using these devices. If employees provide their own safety equipment, the employer is responsible for ensuring that it is appropriate. Respirators must be provided by the employer.

As part of both 29CFR1910.132 compliance and its chemical hygiene plan, the employer needs to specify the circumstances under which an employee should use PPE. When should safety glass versus chemical splash goggles be worn? When should gloves be used? What about lab coats and portable shields? Is hearing protection an issue? Should hearing protection devices be used?

The employer has an additional responsibility. The employer needs to make sure that the PPE is used. Working safely should be a condition of employment. Employees who fail to use required PPE should receive appropriate warnings, disciplinary action, and then be dismissed.

Any policy that falls short of providing for the provision of dismissal is inviting violations that can not be addressed and prevented. It allows employees to jeopardize their own health and safety and that of others around them without the possibility of necessary disciplinary action. Normally, it will not be necessary to invoke this final action. However, the availability of the sanction improves the compliance efforts.

The OSHA Personal Protection Standard requires employers to do workplace hazard assessment to determine the protective equipment needed. The employer must then provide the equipment and train employees in its use.

Source: Kaufman, James A., *Laboratory Safety Guidelines - Expanded Edition*, The Laboratory Safety Institute, [www.labsafetyinstitute.org](http://www.labsafetyinstitute.org).

# HIGHLY SKILLED AND MOTIVATED SCIENTISTS AND TECHNICIANS ARE ESSENTIAL TO THIS SUCCESSFUL LAB

by Sara Goudarzi

**J**ason Todd is in the business of solving puzzles—in the laboratory. As a manager of the liquid chromatography lab and co manager of the gas chromatography lab at Polymer Solutions Incorporated (PSI) in Blacksburg, Virginia, he's continually solving chemical and material mysteries.

"Some of the more interesting and exciting projects we have worked on over the years have involved testing the chemical composition of a product to understand the cause of failure, or to determine whether our customer's competitor is infringing on a patent," he says.

"Many of these projects become quite large in scope, and the testing is very detailed. We often have to be very creative in our analytical approach

to these complex problems. It's very rewarding when we find an answer that helps our customer."

Polymer Solutions is an independent testing lab that provides highly customized analytical solutions to clients. The lab provides chemical analysis, physical tests, and research and development assistance, among other services.

"Most of this testing is highly customized, and we often develop and validate test methods to meet the customer's needs."

"We have a large client base in the medical device and pharmaceutical, plastics and rubber, transportation, and consumer products industries," Todd says. "The types of projects we work on can be categorized as failure analysis, material characterization, quality control, and competitor product analysis. The test methods used by PSI measure the material properties or chemical composition of a sample."

## Lab structure

Polymer Solutions occupies about 15,000 square feet of space. Within the company campus there are four labs: the applied chemistry and spectroscopy laboratory; the thermal, physical, and microscopy laboratory;



▲ Jenny Hazlett installing a syringe in the autosampler of PSI's GC-MS units.

the gas chromatography laboratory; and the liquid chromatography laboratory. The two labs—liquid chromatography and gas chromatography—that Todd manages and co manages occupy approximately 1,500 square feet of space and have future plans for expansion.

The main techniques performed in the gas chromatography laboratory are gas chromatography (GC) and gas chromatography-mass spectrometry (GC-MS). In the liquid chromatography laboratory, specialists focus on high-performance liquid chromatography (HPLC) and gel permeation chromatography (GPC).

“In the liquid chromatography lab we do a lot of GPC work, which involves measuring the molecular weight distributions of polymer samples,”

explains Todd. “We use HPLC, GC, and GC-MS to test polymer samples for additives such as antioxidants and light stabilizers, as well as for residual monomers, residual solvents, and other impurities. We perform extractables and leachables testing on plastics that are used in implantable medical devices and packaging for drug products.”

“Most of this testing is highly customized, and we often develop and validate test methods to meet the customer’s needs,” he adds.

The work for both labs is performed by a team of seven, with room for another in the gas chromatography lab. Most of the bench chemists and technicians in the labs have earned undergraduate degrees in chemistry

or biology. Todd has a bachelor of science in chemical engineering and a master of science in wood science and forest products, with extensive coursework in polymer chemistry. Many of the other lab managers in the organization also have completed courses in the polymer science field.

With the proper expertise and lab structure, the company manages to provide quality service to hundreds of clients each year.

“We have a very flat organizational structure that promotes teamwork and collaboration at all levels,” Todd says. “The people in the LC lab report directly to me, and I report directly to the founder and CEO of the company, Jim Rancourt, Ph.D.”





▲ Travis Powell (front) and Katie England (back) setting up the HPLC instruments for analysis of client samples.

Because of a current vacancy in the gas chromatography lab, Todd helps co manage the lab with a project manager. The duo then report to company CEO Rancourt.

“We really have to support each other to deal with our challenging and ever-changing workload,” he says.

“A lot of my time is spent as a technical consultant, advising the LC and GC lab staff on method development and troubleshooting instruments and methods,” Todd adds. “I approve some of the GPC, HPLC, and GC data before it is reported to our customers and also write or edit many reports.”

“The ability to share resources is a result of intentional cross-training. Lately it seems everyone is very busy all the time.”

Additionally, Todd spends a good portion of his time consulting with customers—answering questions they have about work that his team has performed on a current project or coming up with a plan for a future project.

“There’s also a lot of documentation to draft, edit, and approve for our quality system, including test method procedures, method validation protocols and reports, and equipment qualifications,” he says.

Although project sizes vary considerably, Todd estimates his teams process a few hundred samples each month. However, smaller sample sets of fewer than ten are not uncommon.

“We’re not a high-throughput lab such as an environmental or medical lab,” he says. “We perform mostly customized methods that require a lot of time to set up and a lot of attention to detail.”

### Inventory, hiring, and maintenance

In order to keep operations running smoothly, each of the four labs monitors its own inventory of critical supplies. Each week the managers of the labs provide an inventory list to the company’s lab support department. For general lab supplies, the lab support department maintains inventory for all the company’s labs.

To maintain nearly all major instruments used in the laboratory, Polymer Solutions utilizes service contracts with equipment vendors. Additionally, most instruments undergo annual preventive maintenance by the manufacturers. However, the daily upkeep of machines is left to the staff.

“Our lab technicians perform a lot of day-to-day maintenance such as ion source cleaning on mass spectrometers and HPLC pump seal and check valve replacement,” Todd says.

“Because most of our projects are very short duration—two weeks or less—and we can’t afford a lot of downtime, we do a lot of troubleshooting and simple repairs ourselves, with phone support from the vendor,” he adds. “If it turns out to be a more involved repair than we can handle ourselves, at least the service engineer will have some idea of what parts are needed when arriving for the repair.”

Additionally, to ensure that data produced in the lab is valid, the lab equipment needs to be qualified. This is especially important for Polymer Solutions because of the work they conduct for their Food and Drug Administration (FDA)-regulated clients.

“We do most of the equipment qualifications ourselves, because it allows us to customize the operational qualification (OQ) and performance qualification (PQ) to fit our specific requirements and allows a more consistent approach to qualification within our organization,” Todd explains. OQ and PQ are performed to show that a piece of equipment functions properly in its installed environment and is suitable for its intended use.



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With so much to do and such a small staff, each person becomes an important part of running the laboratory. For this reason the company takes great care when looking for new staff members. Each lab manager carefully reviews resumes, conducts interviews, and with support from human resources is responsible for finding a good fit for the individual lab.

“This field is very specialized,” Todd says. “Highly skilled and motivated scientists and technicians are the key to a successful laboratory. Hire the right people and invest in appropriate training and education—you may be able to find someone who is experienced in chromatography, for example, but may not necessarily have a background in polymer science as well. Make sure your workers understand the science behind what they are doing and why their work is important to the client. Insist on high standards of quality for the work product that is sent to your clients.”

Once the company finds the right people, it’s important to ensure that they are happy working at the company. Todd and other managers achieve this goal by providing incentives to their staff through pay increases and promotions to recognize performance and growth. The company also provides profit sharing in the form of bonuses to its employees.



▲ *A collaborative meeting in the conference room at Polymer Solutions.*

“We also try to make PSI a fun place to work by encouraging participation in fun activities,” Todd says. “For example, each year we celebrate International Talk Like a Pirate Day. Most of the staff dress up as pirates and participate in pirate-themed contests, including a treasure hunt.”

## Challenges

Workload within the individual labs of Polymer Solutions is highly variable. This makes the work environment quite fast-paced and unpredictable. Often the staff can’t calculate how much time is required to complete many of the highly customized analyses.

“We can never really predict or control the workload for a specific lab or a specific instrument,” Todd says. “Sometimes we will have a very quiet week with very few samples coming in for testing, and the next week we’ll get buried by an avalanche of samples.”

“The more we know about why we’re doing the testing, the more we can help the client.”

“Most of our projects are two weeks in duration, so there’s not much flexibility in scheduling people and equipment to complete the testing on time,” he adds. “It is a real challenge maintaining enough excess capacity in people and equipment to handle the upswings in workload while not overstaffing and becoming unprofitable as a result.”

One way to meet this challenge is to continually assess and allocate the assets available to the company at large.

“We often share resources between labs when one area is very busy, which helps a lot,” Todd says. “The ability to share resources is a result of intentional cross-training. Lately it seems everyone is very busy all the time.”

Another big challenge for the labs has been establishing the quality control systems and documentation that are required for the lab’s work on behalf of FDA-regulated clients. To meet this challenge, Todd and his staff utilize all resources available to them.

“We have gotten help from ex-FDA consultants, attended training courses on GMP compliance, learned from being audited by some of our clients, and put in a lot of hard work over the past few years,” he says.

The challenges of the job are also alleviated by promoting skills that allow information to travel quickly and clearly—both within the lab and between the lab and clients.





◀ Jason Todd, manager of the liquid chromatography lab and co manager of the gas chromatography lab at Polymer Solutions Inc.

“Communication is essential,” Todd says. “We have to really understand our client’s needs, and that information has to get communicated to the person who is actually doing the testing. The more we know about why we’re doing the testing, the more we can help the client.”

“Communication is also very important when things don’t go exactly as planned in the lab and we have to try a different approach to solve a challenging analytical problem. We want to make sure the client is on the same page if we have to deviate from the original plan.”

The challenges and the environment, however, are precisely the reasons Todd enjoys his position as manager.

“The great people I work with and the customers we work for, as well as the wide variety of challenging analytical projects” make the job easy to like.

Additionally, the overarching goal of the company allows Todd and his staff to keep an eye on the finish line—a target whose results could benefit many.

“We work for many companies that make products that improve peoples’ health or standard of living,” Todd says. “By helping our clients solve manufacturing issues or by helping them ensure consistent product quality, our work indirectly benefits the community on a national and international scale as well as locally.”

“We benefit the local community by providing stable, high-quality jobs,” Todd says. “We have two great schools in our immediate area, Virginia Tech and Radford University, and our proximity allows some students to remain in the community after they graduate.”

## FREQUENTLY USED INSTRUMENTS:

- Gel permeation chromatography (GPC) systems with multi-angle light scattering detection for absolute molecular weight measurement (detectors from Wyatt Technology Corporation or Malvern Instruments; pumps and autosamplers from Shimadzu). These are used exclusively for measurement of polymer molecular weight distributions.
- Shimadzu LC-20 Prominence HPLC systems, which are used for analysis of antioxidants and light stabilizers in polymers, as well as a wide variety of other custom HPLC methods that our clients request.
- Thermo Trace DSQ GC-MS systems, which are used for identification and quantification of impurities in polymers (e.g., residual monomers and residual solvents), as well as identification and quantification of polymer additives.

*Sara Goudarzi, is a freelance writer based in New York City. Her website is [www.saragoudarzi.com](http://www.saragoudarzi.com).*

## USERS DEMAND ACCURACY, CONSISTENCY AND CAPABILITIES

by Mike May, Ph.D.

In science laboratories, researchers know the value of keeping samples frozen for long periods of time. Nonetheless, many scientists don't give much thought to the features of a laboratory freezer. Such a lackadaisical attitude surely changed for some scientists after they heard about the recent freezer malfunction at McLean Hospital outside of Boston, Massachusetts. That freezer contained brain samples to be used for autism research conducted by the Harvard Brain Tissue Resource Center.

Given that accident, it's not surprising that an increasing trend in laboratory freezers involves reliability. At Reflect Scientific (Orem, UT), principal scientist Boyd Bowdish, Ph.D., agrees. That's why, he says, "our system is a mission-critical design, so every point is redundant."

### Trends in tracking

"Anyone with a freezer in a lab has lots of money tied up in the samples," says Larry Miller, account manager at RURO (Frederick, MD). "The trend we're seeing is people finally spending some of their money to fine-tune sample tracking." He adds, "After a short time, most people lose track of what's in their freezers."

Although a lab might track lab samples in a spreadsheet program, Miller thinks that's not enough. "The transition and turnover in labs makes it almost an insurmountable task," he says. As a result, he notes, "people are getting tired of wasting time searching for their frozen samples. You can literally have thousands of samples with little or no information about them."

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**"The trend we're seeing is people finally spending some of their money to fine-tune sample tracking."**

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Miller points out that people can end up unsure about many things: what a sample is, how old it is, who put it in the freezer. To track samples over the years without even opening the freezer door, Miller recommends a radio frequency identification (RFID) system that identifies all the samples and keeps track of their background.

### Environmental enhancements

Users also want freezers that expend less energy. As Bowdish says, "Users want sustainability on the environmental-responsibility front." He adds, "At the point of use, our freezing system eliminates 90 percent of the electrical power

that a mechanical freezer uses." The Reflect freezers reduce electric use by cooling with liquid nitrogen and using a technique that requires no compressors.

Overall, says Bowdish, the efficiency of a freezer depends on the insulation properties and the cooling medium. The total freezer-related use of energy also goes beyond the device. "A traditional system needs air conditioning in the room where it's located," says Bowdish, "because of the heat from the freezer." He adds, "Our system, at any time, uses a maximum of 500 watts, so our carbon footprint is very small at the point of use."

The environment around a laboratory freezer can also be improved. "With mechanical freezers," says Bowdish, "the safety problem is not the cold so much as it is the noise. They can be very loud." To handle that lab-safety issue, try a liquid-cooled freezer with a pump, which won't make as much noise. Moreover, the noise from a freezer can even be muffled, and the remaining noise can be piped outside.

Cleaning a lab freezer can also create some problems. The extreme cold alone requires care. Plus, some lab freezers ice up, which can create large cakes of ice that take up space that could be used to store samples. Some samples can even get trapped in

the ice and need to be chipped out. The freezers from Reflect create only a frozen powder that can be wiped out. “You still need to be careful, though, because it’s cold,” Bowdish says.

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**“With mechanical freezers, the safety problem is not the cold so much as it is the noise.”**

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## Ramping up reliability

Reliability covers lots of ground in terms of laboratory freezers. Says Bowdish, “Users don’t want the freezer to break. They want reliability and consistency, so our freezers maintain an internal variation of  $\pm 3$  degrees Celsius at any point in the freezer.”

To keep the environment consistent inside a freezer, its recovery time also matters. That is, when someone opens a freezer’s door, how long does it take the temperature to equilibrate to the set point throughout the device? “After a one-minute door open and close,” says Bowdish, “it takes less than five minutes—typically just 90 seconds—for our freezers to equilibrate.”

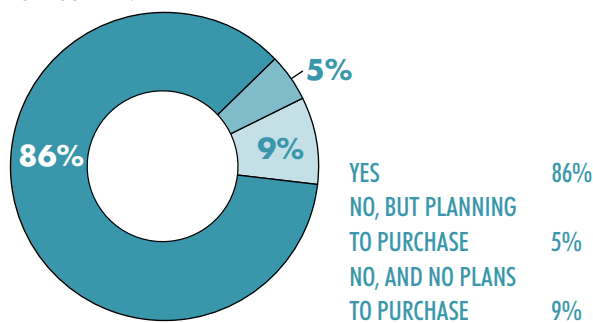
At the Uppsala Biobank in Sweden, director Anna Beskow, Ph.D., also looks for ways to improve the use of freezers. “We use freezers for biobanking,” she says, “and they are manual  $-80^{\circ}\text{C}$ .” She adds, “We are also now buying an automated  $-80^{\circ}\text{C}$  freezer.” The reason for the change from manual to automatic at the Uppsala Biobank arises from the storage format. As Beskow explains, “We store our samples in microtubes in a 96-plate format. The plate has a 1D-code on one side and 2D-codes at the bottom.” Each of these tubes contains 200–250 microliters of sample. “It’s difficult and almost impossible to manage repicking and withdrawals of those tubes manually with secure traceability; therefore, we need automation,” Beskow says. “Our backup samples will still be stored in manual freezers. From each primary sample we get

eight aliquots of these, and we aim to store one to two aliquots in the automated freezer and the rest in manual freezers.” She adds, “So we might still buy more manual freezers.”

As the scenario at the Uppsala Biobank reveals so clearly, different research situations call for different features in laboratory freezers. It’s not always just about the temperature, because many other details come into play. No matter what, though, users require freezers that stay at the desired temperature for years. No one wants to see unnecessary accidents destroying priceless samples.

*Mike May is a freelance writer and editor living in Austin, TX. You can reach him at [mike@techttyper.com](mailto:mike@techttyper.com).*

DO YOU HAVE A LAB FREEZER OR ARE YOU PLANNING TO PURCHASE A LAB FREEZER FOR YOUR LAB?



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# LAB OVENS

## THIS TECHNOLOGY DRIES GLASSWARE, CONTROLS CRUCIAL EXPERIMENTS AND MORE

by Mike May, Ph.D.

**L**ab ovens appear in many settings, from basic research to industrial work. Moreover, scientists can choose from a wide range of options.

"In the scientific world," says Uwe Ross, president at BINDER (Bohemia, NY), "60 percent of the ovens are used for simple drying, and most of the drying is glassware and sometimes plastic." Furthermore, some scientists like lab ovens just the way they are. For instance, Ioana Pavel Sizemore, Ph.D., assistant professor of physical chemistry at Wright State University (Dayton, OH), does not see anything in particular that she would change about lab ovens. Nonetheless, she did make a comment about using them: "I would recommend that students be careful about what kind of labels they use for beakers, to avoid fire."

Still, the past couple of decades have brought big changes in lab ovens. Not all that long ago, some lab ovens required a user to put a thermometer inside and adjust the dial until the oven reached the desired temperature. "Today's state-of-the-art oven is digitally controlled," says Ross. "We've come a long way, and people now just think of this as, 'I need some heat and the rest is irrelevant.'" That type of thinking, Ross adds, means "lots

of people don't know how to select the right product from the many lab ovens available."

### Accuracy all over

Part of the choice of a lab oven depends how much accuracy a user needs and whether that accuracy needs to exist throughout the oven. This is called "spatial temperature accuracy," which Ross describes as "meaning that the temperature is really what the indicator displays, and not just in one spot." Providing such spatial accuracy depends on a combination of insulation and the approach to heating. "The way you heat is the root cause for introducing the same temperature across the entire oven," Ross explains. "Plus, the controller algorithms need to react quickly to changes to keep the same temperature."

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**"Lots of people don't know how to select the right product from the many lab ovens available."**

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Even the door on an oven greatly affects spatial temperature accuracy. "The door makes all the difference in the world," says Ross. He mentions that the doors on many lab ovens are so poorly adjusted that a piece of paper can be slipped through at

the edge. That problem leads Ross to say, "People think of a lab oven as a commodity that they can use for a dozen years without any maintenance, and that's just not the case."

Ross and his colleagues recommend oven maintenance at least every two years. "You start seeing door seals go or the door needs adjustment," he says. "Things need calibration because they've been mistreated, like something banged against the sensor."

### Heating up chromatography

Beyond drying glassware, lab ovens play important roles in analytical processes, such as high-performance liquid chromatography (HPLC). "There are two categories of HPLC ovens," says Bert Ooms, principal scientist at Spark Holland (Emmen, The Netherlands). "One is block heaters, where you clamp the column between pieces of metal." In essence, such heaters protect the column from temperature variations. As for the second type, Ooms says, "We sell forced-air ovens, which include a chamber in which air circulates at high velocity, and this has much better heat transmission between the air and the column." He adds that the second category of HPLC ovens provides better temperature control.

In many modern HPLC applications, researchers want to replace largely organic solvents

with water that includes some organic modifiers. "This is called 'green chromatography,' and it requires ovens that go higher than 150 degrees Celsius," Ooms says. "Today, there are more columns that can withstand those high temperatures." As an example, he mentions carbon columns from Thermo Fisher Scientific (Waltham, MA).

Ooms also points out that many researchers now use ultraHPLC (uHPLC), which uses even smaller particles in the separation column. "If you want to use standard equipment for high resolution," Ooms says, "you can use core-shell particles, which are only superficially porous and higher temperatures from the oven." He adds, "The grouping of a higher temperature for separation and core-shell particles is a nice combination for high-resolution chromatography with a traditional HPLC system."

If an HPLC comes with a block heater, a forced-air version can be added. "It's easy to add," Ooms says. "It just goes between the automated sampler and the detector."

## Evolving options

In 1978, Engineered Product Sales (Orange, CA) started selling ovens for pharmaceutical and industrial applications. Over the past few decades, company president Ken Klein watched the industry develop. "Some years ago," he says, "the builders seemed to stay with cheaper materials for the interiors, like aluminized steel, but they started switching to stainless."

Beyond an evolving manufacturing industry, Klein sees changes in the customers. "Most of the people who buy lab ovens tend to go for the programming controls where they can ramp up and hold or ramp up and down," Klein says. "Controls are cheaper these days, and it's a very minor upgrade to go from a single set point unit." He adds that the simplest units still have a thermometer sticking out of the top to show the internal temperature. If someone buys one of those, though, "more often than not they come back and wish they'd purchased something else," Klein says.

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**"Most of the people who buy lab ovens tend to go for the programming controls where they can ramp up and hold or ramp up and down."**

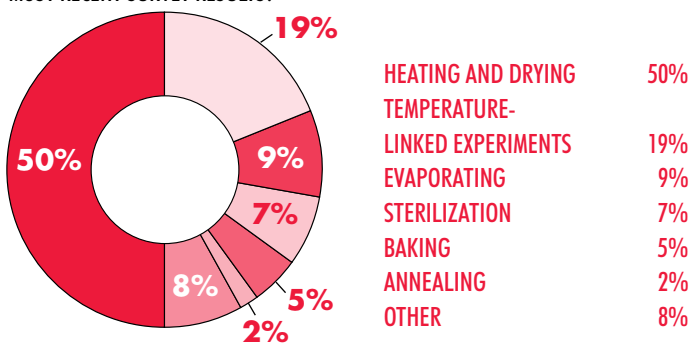
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Users can also choose between gravity and forced convection. In the former type, hot air moves naturally from heating sources. With the latter, blown heat flows from many locations and across all of the shelves. "Forced convection is not that much more expensive, and it seems to be winning out," says Klein.

The increasing number of options gives scientists and engineers more ways to use lab ovens. In essence, anybody who manufactures something or runs research probably uses a lab oven. Plus, the results turn out more accurate than ever.

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# MICROPLATE READERS

## PERFORMING ASSAYS IN PARALLEL

by Angelo DePalma, Ph.D.

Microplate technology has thrived thanks to the desire to avoid radioactive assays and the need to measure more samples faster, at lower volumes, and in parallel.

Analysis software, nonradioactive assays, and robotics (e.g., plate handling, automated liquid handling) are the technologies that enable microplate readers to do their magic. Without appropriate software, data generated by high-density plate readers would overwhelm scientific staff, as would handling and pipetting thirty 384-well plates.

“Users are used to software being intuitive—something they can pick up and run with,” observes Kasia Proctor, global product manager at Molecular Devices (Sunnyvale, CA). The company’s SoftMax Pro monitoring and control software has been available in iPad format since 2011. The iPad platform permits users to upgrade the software’s capabilities by adding instrument or analysis-specific “apps” instead of installing a patch or upgrade.

Small volumes are desirable because they allow higher sample density per plate and save on reagents and sample. However, plates beyond 96 or 384 wells are employed mainly for high-throughput screening. For routine

work one quickly reaches a point of diminishing returns. “There are, in some ways, unrealistic expectations for smaller and smaller samples,” Proctor says.

Many microplate experiments are still conducted manually, but even low-volume operations are beginning to appreciate the consistency and quality of results associated with mechanical and data automation.

The value of ongoing nonradioactive assay development cannot be overestimated. “The application of luciferase for luminescence, of europium and terbium for time-resolved fluorescence, and of fluorescent proteins for fluorescent intensity or polarization have all greatly expanded the functionality of microplate readers,” says E. J. Dell, Ph.D., international marketing director at BMG Labtech (Ortenberg, Germany). These detection modes have made possible real-time phosphorylation assays using fluorescent polarization rather than radioactive ATP, or cell-death assays through time-resolved fluorescence rather than radiolabeled chromium. “With more and more applications developed specifically for the microplate format, the everyday use of microplate readers will only increase.”

Microplate readers are a stable, mature market. “For us, the main trends involve machines with the same basic detection capabilities, but greater flexibility and ease of use,” says Xavier Amouretti,

product marketing manager at BioTek Instruments (Princeton, NJ). The industry is in the same stage, he adds, as the cuvette-spectrometer market, which has not changed in terms of assay capabilities for many years but has become higher-performing and more user-friendly.

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**“Without appropriate software, data generated by high-density plate readers would overwhelm scientific staff.”**

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Most readers today are built for upgradability. One of the most popular “flex” strategies is to purchase a relatively inexpensive unit with monochromator optics only. Once the system is up and running, a service technician can add filter-based detection in about two hours. “This will add several detection modes to your system,” Amouretti observes.

Molecular Devices’ SpectraMax Paradigm reader platform allows users to swap out fluorescence detection cartridges themselves, without a visit from the technician. The cartridges contain 90 percent of the required optics, says Proctor.

According to Dell, during the past five years microplate readers have undergone “major advances that have broadened their use”





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and have “transitioned from being a luxury item in a well-financed facility to being a mandatory piece of equipment for a new start-up laboratory.” BMG Labtech has introduced technologic advances related to absorbance detection and bottom reading (required for cell-based assays).

Until quite recently, microplate absorbance measurements could be performed only with filters or monochromators, limiting researchers to a single number per measurement. Multiple-wavelength assays required multiple reads. Now that a CCD-based spectrometer can be incorporated into the reader, users can conduct full-spectrum reads in under one second per well.

The second innovation solved the problem of low sensitivity during bottom-reading. For this, BMG introduced its Direct Optic Bottom Reading, which precisely focuses light on the plate bottom where cells are located, thus improving the signal-to-noise ratio. Dell claims a 300 percent improvement in S:N with the new system.

### Purchase decisions

Darren Cook, VP for strategy and business development at Douglas Scientific (Alexandria, MN), suggests that purchasers of microplate readers should consider the following factors:

- Usage: Will the system be served in a dedicated, production-like environment, or will it run periodically?
- Longevity: Future needs should be considered, but not overly so, as chemistry and detection modes continue to evolve and improve.
- Detection mode flexibility: Do present and anticipated future needs demand flexibility in experimental design, or is the reader being purchased for a specific project or task requiring a single or very few detection modalities?
- Throughput and parallelism: Will the unit serve a high-throughput application running 24/7 (a process that is time-sensitive, requiring only short but high-intensity runs), or is the application relatively

flexible in terms of scheduling? Consider a highly parallel instrument or perhaps the purchase of two, less feature-rich instruments.

- Sensitivity and capacity: These factors depend highly on the experiments and assays, and should be considered early on in the evaluation process.
- Upgradeability: Upgradable systems may be purchased at a lower price, and modified later as needed.
- Service and support: Aside from preventing downtime and problem solving, top-notch service and support can assist users in getting the most from their readers.

Cook explains, “Ultimately, my best advice is to ensure you get the right tool for the job. I can recall many instances from my personal life where not having the proper tool cost me many multiples of what a project should have cost had the right tool been available.”

BioTek’s Amouretti suggests purchasers consider support, software, and applications, with software paramount. “You deal with it every time you use the instrument, and 90 percent of what you’re doing concerns software, so make sure it is intuitive and doesn’t require you to spend half your time trying to get it to do what you want.”

BMG’s Dell observes that purchase decisions always involve the proper balance of features and price. Features to consider include sensitivity, speed, number of detection modes, plate format compatibility, and “extras” such as spectrometer, reagent injectors, shaking, incubation, gas vent, bottom reading, etc. “If price is a constraint and you cannot afford all of the features you like,” Dell adds, “consider a system capable of upgradability.”

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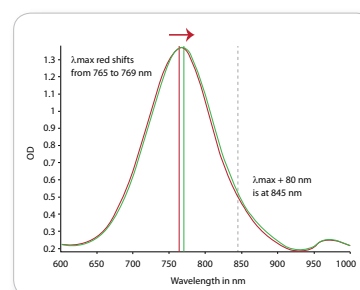
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# THERMAL ANALYZERS

## ECLECTIC TECHNIQUES MEASURE THERMAL PROPERTIES

by Angelo DePalma, Ph.D.

**T**hermal analysis is the broad category of at least 20 techniques that measure some fundamental property of matter as a result of adding heat. For example, dilatometry measures volume changes upon heating, thermomechanical analysis quantifies the change in dimension of a sample as a function of temperature, and thermo-optical analysis detects changes in optical properties on heating or cooling.

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**“Thermal analysis is trending toward user-friendly software, smaller and more compact instruments, availability of auto-samplers, and greater value.”**

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This discussion applies mostly to two techniques, differential scanning calorimetry (DSC) and thermogravimetric analysis (TGA), although many of the ideas presented here apply to other types of thermal analysis. DSC and the related micro-DSC measure the amount of heat required to change the temperature of a sample. DSC is most often used with materials that undergo phase changes.

Homogeneous or nonhomogeneous materials that melt or freeze, or that undergo transformation from one solid form to another, are excellent candidates for DSC. Notable examples include the glass transition temperature of polymers and the interconversion of crystalline polymorphs in the pharmaceutical industry. Approximately 60 percent of thermal analyses involve DSC.

TGA is often used to quantify residual solvent or moisture content of a sample (for example, in foods and pharmaceuticals). A related technique, evolved gas analysis, analyzes gas decomposition products.

### Trends

From the perspective of Kenneth Aniunoh, Ph.D., senior product specialist at Shimadzu Scientific Instruments (Columbia, MD), thermal analysis is trending toward user-friendly software, smaller and more compact instruments, availability of auto-samplers, and greater value. “The same is true for many other laboratory instrument types,” says Aniunoh. “Bench space is at a premium, and overly complicated software can be a real detriment to productivity.”

Simplification without sacrificing features is a trend observable in most lab instruments. Thermal analyzers are no exception. “Thermal analysis used to require an operator with a

Ph.D. in calorimetry or rheology,” notes Kevin Menard, global product manager for thermal, elemental, and hyphenated analysis at PerkinElmer (Shelton, CT). “Now it is a more general-purpose tool. Most of the activity is no longer directed at new instrumentation, but at applications and the development of standardized methods.”

For instrument manufacturers, this means producing systems that are more accessible to technicians with a B.S. degree or even just a high school diploma. Vendors must provide a level of support based on users’ expertise and applications.

This is not as straightforward as it sounds, because many industries test the same types of samples. Polymers, which are targets for up to 70 percent of all thermal analyses, are tested not just at the raw plastics processing plant, but in nearly every manufacturing industry, especially packaging.

Users want thermal analysis systems that deliver results quickly and test several parameters at once. The first requirement is achieved by the use of autosamplers and lab automation. “Years ago, a major oil company might have had twelve DSCs running in one room, and enough scientists to run all of them. Today the number of instruments is far smaller, and there might be just one person in the room,” Menard says.

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## **“Users want thermal analysis systems that deliver results quickly and test several parameters at once.”**

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Multi-parameter analysis is achieved through “hybrid” thermal techniques that pair TGA or DSC with stand-alone chromatographs, GC-MS, LC-MS, or spectrometry. Thus a TGA or evolved gas analysis (for gas decomposition products) will provide not just the temperature of evolution, but an unequivocal identity for the evolved gas. As Menard observes with respect to TGA, “You can’t automatically assume something that comes off at 100 degrees is water. A lot of things come off at about 100 degrees. If you’re working on a drug, the FDA will ask about the identity of impurity, and you’ll need a secondary method to identify it.”

Customers are demanding higher-quality measurements and greater ease of use, according to Steve Aubuchon, Ph.D., product manager for thermal analysis at TA Instruments (New Castle, DE). “Instruments are becoming more ‘walk-up,’” he explains, “and users don’t want to spend half their careers learning to use them.”

TA has focused its efforts on improving the user experience, through both software and sample prep tools. The company also maintains a YouTube channel where it uploads weekly “Tech Tips” on thermal analysis techniques and sample preparation.

Interface, which is based on software, has become nearly synonymous with user experience. TA takes this aspect of product development as seriously as the instrument side, according to Aubuchon. Some features it has introduced include a touchscreen interface, macros and wizards, and the ability to schedule after-hours calibration.

“People don’t realize it, but sample prep is key to the success of a thermal analysis,” Aubuchon tells *Lab Manager Magazine*. TA has recently introduced a sample-loading tool for filling DSC pans with a powdered sample and for tamping down the sample to provide good thermal contact.

## **Purchase decisions**

Kenneth Aniunoh suggests that purchasers, particularly first-time buyers, first speak with an expert about the specific materials and applications that make up the lab’s workflows. “This step costs the customer nothing,” he says. “Most vendors of thermal analyzers will gladly put customers in touch with one of their experts to discuss needs and requirements.” Second, customers must understand the properties they are trying to study, as this provides insight into what types of thermal analysis methods are most suitable. Two other factors are instrument sensitivity and the temperature range of interest, and the likely heating and/or cooling rates likely to be encountered during the lifetime of the instrument.

“And finally, to prevent after-sale buyer’s remorse, customers should request a demo, using their own material,” recommends Aniunoh, “to confirm that the instrument chosen is appropriate for the given application.”

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## **“People don’t realize it, but sample prep is key to the success of a thermal analysis.”**

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“Price is an issue,” says Kevin Menard, “but you really want to look at the cost of ownership, support, and service. If you take many samples per day, you’ll want a good service contract.” An FDA-regulated lab that turns on a TGA once a month, on the other hand, would be more interested in sensitivity and the accuracy of hybridized techniques like GC-MS.

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## ARE YOU IN THE MARKET FOR A... LAB BALANCE?



Close to 50% of the respondents looking to purchase a new analytical balance are replacing an aging balance. Analytical balances are no longer considered to be simply weighing instruments that take point measurements. They have become workflow tools that allow analysts to take care of a process rather than just giving a data point. The advancements in analytical balances come not from hardware but from user interface and software algorithms that translate electrical signals to weight. Lower measurement uncertainty arises from higher data acquisition speed and the efficiency of the algorithmic evaluation that turns data points into weight data. Improved algorithms provide benefits beyond better, faster weighing results. Since the weigh cells are much more reliable and robust, they maintain performance longer and therefore require less frequent calibration and maintenance.

**Our readers' top ten most important factors/features in their decisions to purchase a lab balance:**

	Important
Reliability	<b>97%</b>
Durability	<b>95%</b>
Price	<b>92%</b>
Low maintenance	<b>90%</b>
High Precision	<b>85%</b>
Easy Cleaning	<b>85%</b>
Reputation	<b>77%</b>
Past Experience	<b>74%</b>
Auto Calibration	<b>68%</b>
Sealed Control Panel	<b>57%</b>

With older mechanical balances fading from the picture, balances are becoming sophisticated in terms of user interface, ergonomics, data acquisition, and built-in diagnostics. Most balances interface with the user through a front panel, although some features are available through a computer connection. Newer models are designed to make sample introduction and removal a comfortable experience and to reduce the likelihood of repetitive-stress injuries. For example, quality control or environmental laboratories may run several hundred samples per week; the busiest establishments may encounter such workflows in one day. Copying numbers to three or four decimal places is not only tedious — it may result in skewed results through miscopying weight values or entering them into the wrong location on a spreadsheet. Analysts may not notice anything is wrong until after completing several days' worth of measurements. The last thing a busy lab wants is rework: having to reweigh samples or, in a worst-case scenario, having to prepare a tray of samples and rerun an experiment. Most top-line balances include some sort of connectivity option to help make things easier for users.

**Types of balances respondents are using or planning to purchase for their facilities include:**

Analytical Balance	<b>52%</b>
Precision Balance	<b>26%</b>
Micro Balance	<b>16%</b>
Other Balance	<b>6%</b>

**Components our readers are using with their lab balances include:**

Calibration Weights	<b>33%</b>
Balance Enclosure	<b>23%</b>
Vibration Isolation Table	<b>12%</b>
Weighting Table	<b>12%</b>
Moisture Analyzer	<b>8%</b>
Balance Printer	<b>4%</b>
Barcode Scanner	<b>3%</b>
Other	<b>2%</b>
Keyboard	<b>2%</b>
Evaporation Traps	<b>1%</b>

**The weighing applications respondents are using their lab balances for:**

Pipette Calibration	<b>25%</b>
Differential Weighting	<b>22%</b>
Dynamic Weighing	<b>21%</b>
Mass Comparison	<b>19%</b>
Filter Weighting	<b>11%</b>
Other	<b>3%</b>



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## ARE YOU IN THE MARKET FOR A... pH METER?

In the mid-1930s, Arnold Beckman created one of the first commercial pH meters — made originally to measure the acidity of lemons. Then an assistant professor of chemistry at the California Institute of Technology, he started selling his device as the Model G acidimeter, later known simply as the Model G pH meter. This work led him to start Beckman Instruments, known today as Beckman Coulter, which continues to make pH meters. Today, though, pH meters provide many features beyond those of the Model G. A meter is only one part of a pH system, because an appropriate electrode is crucial to the application. For example, if you are measuring samples with high solids or samples that are low in ionic strength, the pH electrode design will influence the overall system accuracy, maintenance schedule, and the expected life of the electrode. In general, today's pH meters fall into one of three general categories: testers, "portable," and benchtop.

### The top 10 factors/features our readers look for when buying a pH meter:

	Important
Low maintenance/easy to clean	<b>96%</b>
Resolution and accuracy of the meter	<b>95%</b>
Ease of use	<b>93%</b>
Auto calibration with temperature compensation	<b>91%</b>
Availability of supplies and accessories	<b>88%</b>
Longer-lived refillable electrode type	<b>74%</b>
Service and support	<b>74%</b>
Multi-level LCD display; display the current measurement simultaneously with the current temperature	<b>71%</b>
Heavy-duty and waterproof	<b>71%</b>
Detachable electrode probe	<b>67%</b>

### Types of pH meters our readers are currently using or planning to buy for their labs:

	Currently Using	Planning to Purchase
Benchtop pH Meter	<b>53%</b>	<b>4%</b>
Handheld pH Meter	<b>22%</b>	<b>4%</b>
In-line pH Meter	<b>8%</b>	<b>2%</b>
Tester pH Meter	<b>3%</b>	<b>2%</b>
Other	<b>2%</b>	<b>0%</b>

Thirteen percent of the respondents are using a solid state sensor pH Meter while another six percent are planning to make a purchase.

### The methods for measuring pH survey respondents use in their labs:

Glass-electrode method	<b>58%</b>
Indicator methods	<b>23%</b>
Metal-electrode methods	<b>9%</b>
Hydrogen-electrode method	<b>8%</b>
Quinhydrone-electrode method	<b>1%</b>
Antimony-electrode method	<b>1%</b>
Other	<b>1%</b>

Seventy-two percent of lab professionals using pH meters are very satisfied with their products and have no issues.

### Lab professionals using pH meters who are experiencing some problems identified the following challenges:

Frequent re-calibration	<b>24%</b>
Temperature-dependent	<b>13%</b>
Fragile — constant wearing and breaking of glass electrodes	<b>12%</b>
Unreliable/inaccurate measurement	<b>9%</b>
Maintenance-intensive	<b>6%</b>
Limited field applicability	<b>4%</b>
Other	<b>2%</b>
High labor costs	<b>1%</b>
Limited battery life	<b>1%</b>



For more information on pH meters, including useful articles and a list of manufacturers, visit [www.labmanager.com/ph-meters](http://www.labmanager.com/ph-meters)

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## ARE YOU IN THE MARKET FOR... PIPETTES?

Best practices dictate that pipettes undergo preventive maintenance and calibration at least once per year. Calibration involves dispensing set volumes of a liquid, usually water, into the weighing pan of a calibrated balance. Service personnel correct for temperature, humidity, and atmospheric pressure, and then compare the expected weight to the actual weight. Among the numerous service options are end-user, in-house instrument service groups, third-party maintenance organizations, and the original manufacturer. All have their benefits and drawbacks. Small, independent service providers are numerous and focus on academic customers within a relatively small geographic area. Regardless of their size, service organizations work either through "depot" arrangements (pipettes are boxed and shipped to the servicer) or on-site. Servicers generally do not require a minimum number of devices for depot service, but all have requirements for on-site service. The reason pipettes require regular maintenance is that they are mechanical devices that are, in many instances, used constantly. Volatile acids, bases, and organic solvents wreak havoc on the seals, o-rings, and metallic components.

### The top ten factors/features our readers look for when buying a pipette:

	Important
Durability of product	<b>98%</b>
Consistent performance and accuracy of product	<b>97%</b>
Availability of tips and accessories	<b>93%</b>
Low maintenance / easy to clean	<b>89%</b>
Price	<b>86%</b>
Designed to permit recalibration	<b>80%</b>
Service and support	<b>80%</b>
Ergonomic operation	<b>74%</b>
Warranties	<b>73%</b>
Leak detection	<b>58%</b>

Seventy-eight percent of the respondents feel that their current pipette(s) are adequate for their research.

### The sources of errors our respondents encounter with their pipettes include:

Human errors	<b>27%</b>
Viscosity reduces accuracy	<b>16%</b>
Liquids stick to tip	<b>15%</b>
Immersed tips carry over liquid	<b>13%</b>
Surface tension reduces accuracy	<b>10%</b>
Pipettes take up more liquid	<b>7%</b>
Liquids evaporate	<b>4%</b>
Other	<b>4%</b>
Liquid temperature	<b>3%</b>

### The amount of time per day our readers and/or their staff spend using the pipettes in their labs:

Less than 1 hour	<b>24%</b>
1 - 2 hours	<b>29%</b>
2 - 3 hours	<b>17%</b>
over 3 hours	<b>26%</b>

### Types of pipettes survey respondents are currently using or planning to purchase:

	Currently Using	Planning to Purchase
Manual: single channel	<b>28%</b>	<b>4%</b>
Manual: multi-channel	<b>16%</b>	<b>2%</b>
Manual: fixed volume	<b>11%</b>	<b>2%</b>
Electronic: single channel	<b>8%</b>	<b>3%</b>
Electronic: multi-channel	<b>7%</b>	<b>2%</b>
Electronic: fixed volume	<b>1%</b>	<b>1%</b>
Repeater	<b>12%</b>	<b>2%</b>
Other	<b>1%</b>	<b>0%</b>



For more information on pipettes, including useful articles and a list of manufacturers, visit [www.labmanager.com/pipettes](http://www.labmanager.com/pipettes)

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- Includes a hose holder to bundle hoses and keep lab table neat
- Features speed rotation range of 5 to 280 rpm

**E**vaporators and evaporation systems are a key part of the sample prep process in many laboratories and industries. In particular, rotary evaporators have been crucial in materials, forensics, life science, environmental, and chemical industries for decades. In industry, evaporators are employed to improve the storage life of a product or to reduce its volume, as well as to remove water before drying. Rotary evaporators are made up of a vacuum source, collection flask, condenser, rotating flask, and a temperature bath. Dry evaporators, on the other hand, use a dry heat block instead of a bath to evaporate samples quickly under a gentle stream of nitrogen. Concentrators, as their name suggests, are used to concentrate samples and are particularly important in the water treatment and food and beverage industries. If you need to purchase an evaporator or evaporation system for your lab, it's important to know what type and size of samples you will be dealing with most often, how delicate those samples are, and how much space you have in your lab for the instrument. This information will help your vendor ensure that you pick the system best suited to your applications.

## APPLICATIONS

- Food and beverage
- Concentration of substances
- Distillation of substances
- Water treatment/environmental
- Materials, forensics, life science, chemical
- Drug discovery

# WATER PURIFICATION SYSTEMS

by Rachel Muenz

## ELGA PURELAB FLEX 3 & 4

WWW.ELGALABWATER.COM



◀The PURELAB flex 3 & 4 are the latest additions to the award-winning PURELAB flex range of water purification systems. The PURELAB flex offers many advantages for analytical and lifescience applications. It allows users to focus on routine test work, without having to worry about the water quality affecting any test results.

- Ensure accurate, consistent results
- Both systems deliver up to 10 liters of ultrapure water per day and up to 2 liters per minute
- The flex 3 delivers ultrapure water direct from potable tap water and the flex 4 requires a pre-purified feed

## SARTORIUS ARIUM® SYSTEMS

WWW.SARTORIUS.COM



◀These water purification systems from Sartorius include application-focused operating features to make users' daily lab work easier and more reliable. The new arium® water purification systems can be ideally integrated into users' existing laboratory environment and offers users, the greatest possible flexibility.

- More than 70 arium® versions are available to meet users' requirements on water quality and to cover any application
- Equipment qualification and maintenance offered as supplementary services to considerably extend systems' uses even further
- Feature cost-effective water usage and efficient operation
- All arium® systems are already certified when delivered

## EMD MILLIPORE ELIX® ESSENTIAL

WWW.EMDMILLIPORE.COM



◀Elix® Essential systems are suited to laboratories needing an easy-to-use economical solution that provides a constant and reliable source of Type 2 pure water. Patented Elix® electrodeionization technology is combined with complementary water purification techniques, including pretreatment, reverse osmosis and UV lamp treatment (in Elix® Essential UV systems).

- Complement company's existing Elix® range
- Electrodeionization technology ensures consistently pure water quality
- Easy to use and economical
- Provide flow rates of 3, 5, 10 or 15 liters of water per hour
- Includes intuitive system controls, with system alert and alarm icons shown on a color-coded backlit LCD display

## ARIES FILTERWORKS TOUCH SCREEN GEMINI SERIES

WWW.ARIESWATER.COM



◀Designed to provide fully programmable dispensing at the touch of a finger, the Gemini's PLC-based controller and high resolution 3.5" HMI, 2 color display provides the user with four customizable, easy-to-program batch commands — a significant upgrade over the previous microprocessor-based control system. Use of the touch screen's menu button allows the user to program the four individual batches and get systems information.

- Bright, easy to read 3.5" touch panel provides an easy interface for dispensing and programming up to four batches
- Resistivity is clearly displayed with system operation status
- The display turns red to alert the user to alarm conditions
- Features speed rotation range of 5 to 280 rpm

Laboratory water purification systems are a common fixture in a variety of different types of facilities. In order of decreasing purity, the different classifications of pure water are as follows: Type 1, Type 2, and Type 3. Type 2 water is used for tasks such as buffer preparation, clinical laboratory analyzers, and culture media and is also used as feedstock for Type 1 water. Type 3 water, on the other hand is used for cooling and heating devices to avoid problems with mineral deposits from circulating water and is also utilized for washing and rinsing labware. There are a variety of water purification techniques with the most common including ultraviolet oxidation, adsorption, reverse osmosis, electrodeionization, deionization, filtration, and distillation. Some things you should consider if you are looking to buy a water purification system are: what are you using the water for, what type of water you need, and how much water you need. You will also want to ask the vendor what the cost of the system will be over five years and what kind of service and/or warranty is provided. Space is another important consideration in the purchasing process.

## APPLICATIONS

- Rinsing and washing labware
- Buffer preparation and clinical laboratory analyzers
- Culture media
- Testing for contaminants in drug samples
- Molecular biology and cell culture work
- GC, HPLC, UHPLC, AA, ICP-MS and other advanced analytical techniques



## ANALYTICAL

### UV-Vis Spectrophotometer

#### BioDrop TOUCH

- Features a standard-sized cuvette holder and offers seamless compatibility with the new BioDrop CUVETTE for accurate micro-volume applications
- An integrated magnetic pipetting station provides easy sample loading
- Available as either a standalone instrument with software controlled via a large, color, multi-touch display or as a PC only version controlled by the powerful Resolution Life Science Software



BioDrop

[www.biodrop.uk](http://www.biodrop.uk)

### NIR Analyzer

#### NIRS™ DS2500

- Provides excellent optical performance across the full wavelength range (400 - 2500 nm)
- Compatible with FOSS NIR System II and XDS instruments
- Gives users consistent results even in harsh environments
- Suitable for networking using LAN (local) or WAN (Internet)
- Includes new predispersive monochromator



FOSS NIRSystems

[www.foss-nirsystems.com](http://www.foss-nirsystems.com)

### Mass Spectrometer

#### 3500 MiD

- Recently received a R&D 100 award as one of the most technologically significant products to enter the marketplace in 2011
- Fully self-contained, making it highly portable
- Can be easily incorporated within a stack or cluster of instruments on a particular chemist's work space
- Brings the accuracy and reliability of mass spectrometry to on-site analysis applications



Microsaic Systems

[www.microsaic.com](http://www.microsaic.com)

### Online HPLC Tool

#### Supelco HPLC Method Transfer Calculator

- Can be used with isocratic or gradient methods
- Allows method scaling from microbore through preparative columns
- Can be used for all common particle sizes
- Provides an estimated time and solvent savings value
- Is also available for iPhone®, iPad®, iPod touch® and Android devices

Sigma-Aldrich

[www.sigmaaldrich.com](http://www.sigmaaldrich.com)

### 4 µm Ion Chromatography Capillary Column

#### Dionex IonPac AS11-HC-4µm

- For the determination of organic acids and inorganic anions in complex sample matrices
- Has the same selectivity as the current Dionex IonPac™ AS11-HC capillary column so methods can be easily transferred to the new column with minor adjustments
- Can separate 40 organic acids and inorganic anions in less than 40 minutes



Thermo Fisher Scientific

[www.thermoscientific.com](http://www.thermoscientific.com)

## PRODUCT SPOTLIGHT

### FLEXIBILITY FOR THE FUTURE

#### NEW UHPLC SYSTEM GIVES USERS A VARIETY OF CUSTOMIZATION OPTIONS

Thermo Fisher Scientific's new UltiMate 3000 XRS UHPLC system offers new capabilities in solvent delivery and sample handling with a wide range of detector options for high-throughput laboratories.

Rainer Bauder, pharmaceutical markets solutions manager at Thermo Fisher Scientific, said the company made the system so flexible because of customers demanding instruments that could adapt to their future needs.

"We started with customers' strong desire for a highly-flexible, future-proof UHPLC system when designing the UltiMate 3000 XRS," Mr. Bauder said. "Based on early feedback, we feel that we've succeeded."



He added detector options are just one example of the system's flexibility, with choices including charged aerosol detectors for near universal detection of non-volatile analytes, fully UHPLC-compatible optical detectors for UV-Vis absorbance and fluorescence detection, and the Dionex ESA Coulochem III electrochemical detector.

The new UltiMate also offers the lowest gradient delay volume and excellent flow precision and accuracy amongst all leading quaternary UHPLC platforms and is designed to support very robust chromatographic runs with column pressures up to 1,250 bar (18,130 psi).

A 45 nL, ultra-low dispersion flow cell that lets mass spec users monitor how contaminated their samples might be is another benefit of the UHPLC, Mr. Bauder said.

"Also, if there's a blockage in the mass spec interface, it is simply a great feature to have a separate detector in the system so the problem can be quickly identified," he explained, adding autosampler choice is also important for users' workflows.

But, no matter their initial choices, Mr. Bauder said customers can always make changes later.

"They can change the detector, the column compartment, or other modules to make their investment future-proof."

For more information, visit [www.thermoscientific.com/uhplc-xrs](http://www.thermoscientific.com/uhplc-xrs)

### WB Immunoaffinity Column

#### VICAM® DON-NIV™

- Simultaneously screens for deoxynivalenol (DON) and nivalenol (NIV)
- Coupled with liquid chromatography analysis, the DON-NIV WB column provides over 90% recovery of both DON and NIV
- Doubles the productivity of commercial, government, and food safety research laboratories
- Provides rapid and simple sample preparation using the monoclonal antibody technology

Waters

[www.waters.com](http://www.waters.com)

## BASIC LAB

### Ductless Filtration System

#### Vent-Box

- Designed to protect laboratory personnel from chemical vapors found inside of stand-alone chemical safety cabinets
- Fumes are pulled via a flexible hose connected to the cabinet and clean, filtered air is returned to the laboratory
- Eliminates the need for external ducting and minimizing loss of treated, conditioned air from the facility



Air Science USA

www.airscience.com

### Personal Lab Sterilizer

#### CoolCLAVE™

- Uses ozone gas to clean users' laboratory tools
- Effective in sterilizing and deodorizing lightly contaminated pipettes, pipette tips, gloves, plates, small instruments, and even personal items such as keys and glasses
- Easy to use—to sterilize items, simply place them inside the sterilizer and press START
- Operates without using any harsh chemicals



AMSBIO

www.amsbio.com

### Automated Benchtop SEM

#### EXpressX

- Combines a robust scanning electron microscope, ASPEX's own OmegaMax EDX technology and new Perception 2 operating software
- Features excellent sensitivity and productivity at an affordable cost
- New Perception 2 operating software features an improved, simple single monitor graphic user interface
- Provides a single source solution for detecting, identifying and characterizing features rapidly and automatically



ASPEX

www.aspecorp.com

### Water Manifold

- Converts the flow from a single tap into three streams enabling optimal use of a fume cupboard water supply
- Equally effective linked to Liebig or Vigreux condensers as it is to a recirculating chiller and avoids "daisy chaining" multiple condensers
- Designed to be clamped to standard fume cupboard scaffolding



Asynt

www.asynt.com

### Centrifuge Bundles

#### Thermo Scientific Heraeus

- Combine Heraeus centrifuges with the necessary components so that customers can complete their purchase with one order and save
- Range of bundles offered—based on customer applications, including cell biology, tissue culture, clinical work, or basic fluid separation
- Each centrifuge features the glove-friendly ClickSeal® biocontainment sealing system



Cole-Parmer

www.coleparmer.com

## PRODUCT SPOTLIGHT

### SILENT SPINNING

#### MICROCENTRIFUGE'S LOW NOISE LEVEL IMPRESSES THE MOST

Earlier this summer, Eppendorf announced a new refrigerated centrifuge, the 5424 R, which the company says sets the new lab standard with established ergonomics, excellent quality, and solid temperature control.

Matthew Lieber, product manager for centrifugation and sample prep at Eppendorf, said customers are most impressed by how quiet the centrifuge is.

"They love the low noise level—much quieter than its predecessors," Mr. Lieber said. "They also love the small footprint and the increased speed; it lives up to the quality they have come to expect from Eppendorf."



This 24 place centrifuge can spin up to 21,130 x g and can accurately cool to set temperatures from -10°C to 40°C. The microcentrifuge includes a condensation drain to eliminate water accumulation and to prevent corrosion.

There are a number of features in particular that set the new instrument apart from other centrifuges on the market, Mr. Lieber added.

"The FastTemp program takes just eight minutes to cool the sample down to 4°C, unmatched in the industry," he said. "In addition, the design of the lid minimizes the noise level so much that it can even be run without the rotor lid. Finally, the 5424R has Eco-Shutoff, a mechanism that automatically turns off the compressor after eight hours of non-use."

Eppendorf's 5424 R also allows users plenty of versatility with four different rotor options. Those choices include the unique Kit rotor, which is designed with an extended rim to support tube caps when using MiniPrep spin column kits.

**For more information, visit [eshop.eppendorfna.com/Eppendorf\\_5424-R\\_centrifuge](http://eshop.eppendorfna.com/Eppendorf_5424-R_centrifuge)**

### Microcentrifuge Rotor System

#### QuickLock

- Rotors 18x1.5mL for microcentrifuge 5418 R and 6x50mL rotor for multipurpose centrifuges 5804 R and the 5810 R now have a lid locking mechanism that makes every day routines faster, and easier
- Lid system requires only a quarter of a turn to have certified aerosol-tight containment
- Provides easy access and safe centrifugation of precious samples



Eppendorf

www.eppendorfna.com

## Ductless Filtering Storage Cabinets

### Captair® Store™

- Designed to store a wide variety of chemicals used in laboratories
- Reduces inhalation risks associated with the concentration of vapors and purifies the laboratory's ambient air 24 hours a day
- Equipped with silent turbine fans that draw chemical vapors into a molecular, high absorption filter
- Also available in a compact model

Erlab  
www.erlab.com



## Dual Channel Industrial Permeation System

### Span Pac™ 261 I

- Produces suitable standards for effective calibration for total sulfur
- One channel is operated at 40°C and is used for ppb COS plus 0.5ppm each of H<sub>2</sub>S, methyl and ethyl mercaptans
- The second channel is typically operated at 60°C and is used for similar concentrations of dimethyl sulfide, dimethyl disulfide and/or thiophene

KIN-TEK



www.kin-tek.com

## Environmental Transmission Electron Microscope

### Titan ETEM G2

- Enables time-resolved, in-situ studies of processes and materials exposed to reactive gases and elevated temperatures
- Extends TEM analysis to dynamic processes and interactions
- Helps researchers improve the performance of catalysts
- Can be fitted with an image Cs corrector and FEI's proprietary X-FEG and monochromator technology
- Includes a redesigned user interface

FEI



www.fei.com

## Water Purification Systems

### AFS® 8D and AFS® 16D

- Offer cost-effective solutions for analyzers' degassed water needs up to 320 L daily
- Complementary water purification techniques ensure delivery of degassed clinical laboratory reagent water to comply with the CLSI® guideline
- Robust and easy-to-use systems require little maintenance, help reduce analyzer downtime
- Incorporate a number of automatic self-maintenance functions

EMD Millipore

www.emdmillipore.com



## Handheld Colorimeters

### Checker® HC

- Checker line now includes 12 new colorimeters
- Designed as an accurate, affordable alternative to chemical test kits
- Meters measure a variety of parameters including: ammonia (low, medium and high ranges), nitrite (low and high range), total chlorine (ultra-low range and high range), low range silica, bromine, chromium VI, marine calcium, and alkalinity

Hanna

www.hannainst.com



## Gas Analysis Systems

### SPM 220 and HPA 220

- Used to monitor and document vacuum processes, such as coating architectural glass or thin-film solar cells
- Both available in mass ranges of 1-100 and 1-200 amu; the HPA 200 is also available from 1-300 amu
- Equipped with a number of digital and analog inlets and outlets which enable their simple connection to process control systems

Pfeiffer Vacuum

www.pfeiffer-vacuum.com



## Benchtop Scanning Electron Microscope

### NeoScope II

- Now with higher magnification, multi-touch screen control, and a sleek new design
- As simple to use as a digital camera
- Produces images with a large depth of field at magnifications ranging from 10X - 60,000X
- Features both high and low vacuum operation, three selectable accelerating voltages, and secondary electron and backscattered electron imaging

JEOL

www.jeolusa.com



## Open Tank Circulating Bath Systems

- Available with either stainless steel or polycarbonate tanks
- Offered in reservoir sizes ranging from 6 to 28 liters and with three different temperature controllers
- All controllers display both actual and set point temperature on a readout that is easily read from across the lab

PolyScience

www.polyscience.com



## Manual and Electronic Pipettes

### Sarpette® M and E

- Available in single, 8, and 12 channel configurations
- M pipettes feature continuously adjustable volumes from either the dispenser button or thumbwheel and offer excellent accuracy and precision
- E model electronic pipettes are controlled by a high-precision motor and microprocessor to ensure smooth and accurate pipetting
- Pipette tips offered in a wide range of packaging and purity options



Sarstedt

[www.sarstedt.com](http://www.sarstedt.com)

## Wireless Current Logger

### RTR-505-mA

- Measures 4 to 20 mA currents
- Can be used to measure current directly or from the output of a wide variety of sensors
- Features an accuracy of  $\pm 0.05$  mA and resolution of 0.01 mA
- Includes a large LCD display, capacity for 16,000 readings, IP64 water resistance and up to 4 years battery life with the "L" version



T&D

[www.tandd.com](http://www.tandd.com)

## Supercritical Fluid Extractor

### SFT-250

- Designed to perform a variety of extractions in supercritical fluid and is engineered to meet the day-to-day rigors of the research lab
- May be used for small scale pilot processing
- Simple to operate and easy to modify for evolving applications needs
- Features operation pressure range of up to 10,000 psi



Supercritical Fluid Technologies  
[www.supercriticalfluids.com](http://www.supercriticalfluids.com)

## CHEMICALS, KITS & REAGENTS

## Whole Genome Amplification Kits

### GenomiPhi™

- Provide researchers with a pre-dispensed, room temperature stable formulation for whole genome amplification
- Enable a simplified workflow for obtaining large amounts of high quality DNA from small genomic DNA samples
- Deliver improved yields over the current GenomiPhi kits
- Available in two formats; Ready-To-Go GenomiPhi V3 and Ready-To-Go GenomiPhi HY



GE Healthcare

[www.gelifesciences.com](http://www.gelifesciences.com)

## Low Temperature Bath

### CharpyCool

- Eliminates the need for costly consumables such as liquid nitrogen or dry ice
- Compact and completely self-contained
- Offers up to 8 liters of working fluid volume enabling up to 91 Charpy impact test specimens to be accommodated at temperatures between -80°C and +30°C
- Includes a digital temperature display



SP Scientific

[www.spscientific.com](http://www.spscientific.com)

## Kits for Mutagenesis, Cloning and Assembly

### GeneArt®

- Allow molecular and synthetic biologists excellent speed, flexibility, precision, and efficiency for the seamless cloning, assembly, and editing of genetic material
- Range includes Seamless PLUS Cloning and Assembly Kit, Seamless Cloning and Assembly Enzyme Mix, and Site-Directed Mutagenesis PLUS System
- All products include access to Life Technologies' free online GeneArt® Primer and Construct Design Tool

Life Technologies

[www.lifetechnologies.com](http://www.lifetechnologies.com)

## UV Viewing Cabinet for Gel Analysis

### CL-150 Series

- Enable lab technicians to view, analyze and photograph fluorescent samples with both epi-illumination and trans-illumination light sources
- 25-watt white light bulb in the cabinet provides visible illumination for easy sample preparation
- Accommodates large electrophoresis gels and up to four 8 x 8" (20 x 20cm) TLC plates



Spectroline

[www.spectroline.com](http://www.spectroline.com)

## Chemical and Reagents Portfolio Expansion

### "M" Brand

- 14,706 products to be available in North America for the first time
- Provides standardized products and consistency throughout the world under the new global "M" brand
- Products offer excellent specifications and innovative, environmentally friendly packaging for less waste and greater safety
- These products will be launched in phases throughout 2012 and 2013

EMD Millipore

[www.emdmillipore.com](http://www.emdmillipore.com)



## Liquid Stable Homocysteine Kit

- Provides a convenient and accurate method for the determination of homocysteine in human serum and plasma
- Includes liquid, ready to use reagents requiring no preparation for ease of use and the elimination of reconstitution errors
- Standards are provided within the kit for user convenience
- Features on-board stability of 28 days, minimizing reagent waste

**RANDOX**

Randox

[www.randox.com](http://www.randox.com)

## Automated Bioreactor System

ambr 250™

- Features increased fermentation volumes, as well as individual bioreactor temperature and impeller control
- Allows rapid testing of a range of conditions and microbial strains to select the optimum ones for efficient scale-up to large scale bench top, stirred tank bioreactors
- A good fit for use in assessing different fermentation parameters with production microbes



TAP Biosystems

[www.tapbiosystems.com](http://www.tapbiosystems.com)

## LAB AUTOMATION

### Automatic Aseptic Sampling System

EMPAT

- Collects samples directly from bioreactors aseptically and automatically
- Saves time and removes the risk of potential error and improves the precision of quality control measures
- Easy to install and program and operates continuously around the clock
- Seamlessly integrates with existing data systems giving users real-time process characterization



Alfa Wassermann Separation Technologies

[www.awst.com](http://www.awst.com)

### Linear Barcode Reader

Tracxer BC210

- Allows users to scan 1D barcodes on racks
- Operating as an accessory for the Micronic RS210 Tracxer Code Reader, it enables users to read both their rack barcode and storage tube codes within just 5 seconds
- Further minimizes the risk of incorrectly placed racks and increases sample and rack traceability



Micronic

[www.micronic.com](http://www.micronic.com)

### Pre-Analytical System

cobas p 312

- Offers vendor-neutral sample management for labs with limited floor space
- Compact, stand-alone system performs sample registration, sorting, decapping and archiving of all sample tubes
- Features a throughput of up to 450 tubes per hour
- A good option for customers who are looking for an entry-level step into automation for pre-analytical workflow



Roche

[www.roche.com](http://www.roche.com)

### Screen Optimizer

Woodpecker

- Broadens TTP's currently available crystallography portfolio, enabling the simple, reliable and fast set-up of screen plates
- Combines novel pipetting technology with non-contact positive displacement pipetting
- Allows the dispensing of a broad range of fluid viscosities from as low as 0.5 µL directly into crystallography plates without the need for liquid classification



TTP Labtech

[www.ttplabtech.com](http://www.ttplabtech.com)

### Cell Imaging Systems

Yokogawa CV7000

- Features simultaneous three color imaging and an incubated stage (temperature, humidity and CO<sub>2</sub> controlled)
- New larger sCMOS cameras provide four times the image area of typical EMCCD cameras, enabling imaging of a 384-well plate in four minutes with a 50ms exposure time
- Makes live cell experimentation practical in a wide range of formats



Wako Automation

[www.wakousa.com](http://www.wakousa.com)

## LIFE SCIENCE

### RNA Ladders

RiboReady™ Color

- Allow users to easily estimate RNA molecular weight and confirm RNA transfer from gel to membrane
- Two new ladders feature six bands pre-stained with two distinguishable colors for easy size identification
- Supplied in a ready-to-use mixture that does not require heating or addition of denaturing agent before use



AMRESO

[www.amresco-inc.com](http://www.amresco-inc.com)

## Cell Signaling Assays

### Bio-Plex Pro™

- For detecting phosphorylated and total proteins involved in key intracellular signaling pathways
- Take advantage of the magnetic bead workflow to simplify assay preparation and improve precision
- Have been reformulated and optimized to provide exceptional sensitivity, high specificity, and improved performance over western blot and ELISA methods
- Available in singleplex sets and custom premixed all-in-one kit formats



Bio-Rad

[www.bio-rad.com](http://www.bio-rad.com)

## Integrated Digestion Platform

### Perfinity

- Automates key proteomics workflow steps to significantly reduce sample preparation times and enhance reproducibility
- Features a customized Shimadzu HPLC system and multiple Perfinity columns
- Reduces sample prep to 30 minutes or less
- Removes much of the equipment and labor associated with LCMS analyses of proteins, minimizing a potential source of error and improving laboratory productivity

Shimadzu  
Perfinity Biosciences

[www.ssi.shimadzu.com](http://www.ssi.shimadzu.com)  
[www.perfinity.com](http://www.perfinity.com)

## Single-Cell AutoPrep System

### C1™

- Enables a researcher to isolate and process individual cells rapidly and reliably for genomic analysis
- Lets researchers isolate cells, extract RNA, and then reverse transcribe and preamplify mRNA transcripts automatically to enable detection and analysis of cell activity
- Includes the C1 Single-Cell AutoPrep System, the C1 Single-Cell AutoPrep Array chip and the C1 Single-Cell AutoPrep Reagent Kit



Fluidigm

[www.fluidigm.com](http://www.fluidigm.com)

## CCD Cameras

### CoolSNAP MYO and CoolSNAP KINO

- Allow scientists to detect finer details of dimmer samples under lower light levels
- Come equipped with a new sensor technology that packs twice as many pixels with a 15 percent improvement in peak quantum efficiency compared to current CCD technology
- Enable scientists to achieve higher quality, higher resolution images than previous CCD technology



Photometrics

[www.photometrics.com](http://www.photometrics.com)

## High Performance Nitrocellulose Membranes

### Whatman™ FF

- Optimized for diagnostic assay reproducibility
- Enable fast, razor-sharp line separation and highly reproducible results for the detection of target molecules in liquids such as water, urine, blood and saliva
- Suitable for use in lateral flow assay manufacture as they provide improved reliability and rapid results
- Available with different capillary rise times (wicking rate)



GE Healthcare Life Sciences

[www.gelifesciences.com](http://www.gelifesciences.com)

## EMMCD Camera

### Evolve 512 Delta

- Enables researchers to obtain high quality super-resolution images in half the time it takes other 512x512 EMMCD cameras
- Equipped with a sensor running at 20MHz that captures images at 62.5 frames per second and less than 1e- read noise (using EM gain)
- Makes super-resolution imaging more productive and efficient



Photometrics

[www.photometrics.com](http://www.photometrics.com)

## Media Preparation Systems

### MEDIACLAVE 10/30

- Now provide the feature of digitally signed log files as a safeguard against tampering with downloaded files
- Signed log files fully comply with FDA (21CFR Part 11) and EU (GMP Annex 11) directives requirements for electronic process documentation
- Newly integrated USB port allows the automated transfer of all run data log files to a flash drive



INTEGRA

[www.integra-biosciences.com](http://www.integra-biosciences.com)

## Bioprocess Monitoring System

### Ranger™

- Enables automated batch feeding to optimize metabolism, and ultimately increase yields in biologics manufacture
- Can be integrated into all bioprocessing systems, running microbial or mammalian cell cultures
- Allows bioprocess managers to monitor and control metabolic rate, observe both single batch and batch to batch processing trends, and accurately determine end of process

Stratophase

[www.stratophase.com](http://www.stratophase.com)

## LIMS &amp; SOFTWARE

## Stability Study Module

## Matrix Gemini Stability

- Retains the protocol management features and the sample handling processes together with analytical result capture
- Provides a fully integrated statistics module that provides graphical interpretations including predictions of product shelf life well before the study is complete
- Implementation of the system is quicker and the management process made easier with faster interpretation of results

Autoscribe

[www.autoscribe.co.uk](http://www.autoscribe.co.uk)

## Enterprise Cloud Solution

## Safety Inspection Live™

- Enables users to perform safety inspections using the most popular mobile devices such as Apple® iPhones®, iPads®, Google® Android™, etc.
- Eliminates duplicate transcription processes and allows users to enter inspection data at the time of inspection
- Ensures greater data accuracy and more efficient inspection management and reporting



ChemSW

[www.chemsw.com](http://www.chemsw.com)

## Chromatography Software

## Clarity 4.0

- New features include a DHA extension for Detailed Hydrocarbon Analysis, new support for bar code readers, enhancements to peak integration etc.
- Now includes control modules for Young Lin YL6500 GC, Spark SPH 1240 pumps, Cetac AS800 autosampler, Altech ELSD 3300, Ecom Flash DAD
- Control modules for Agilent HPLC 1100/1200/1260/1290 series have also been completely reprogrammed



DataApex

[www.dataapex.com](http://www.dataapex.com)

## Image Acquisition and Analysis Software

## MetaXpress 5.0

- Designed to improve the ease and speed of custom analysis using Molecular Devices' ImageXpress® Micro and Ultra Systems
- Enables user-created analysis to be run on MetaXpress PowerCore™ Software
- An interactive tool incorporated into the software allows users to create custom analysis easily, without resorting to dedicated programming expertise



Molecular Devices

[www.moleculardevices.com](http://www.moleculardevices.com)

## SUPPLIES &amp; CONSUMABLES

## Solutions of Thyroid Hormones

## Snap-N-Spike®

- Include thyroid hormones T4, T3, and reverse T3 at concentrations of 100 µg/mL in 0.1 N ammonia in methanol for each solution standard
- Suitable for use as critical starting materials in preparation of calibrators, controls, or linearity standards for analytical testing
- Prepared and certified to the highest industry standards including ISO Guide 34 and ISO 17025

Cerilliant

[www.cerilliant.com](http://www.cerilliant.com)

## Repeater Tips

## Combitips advanced®

- Offer safe, accurate dispensing of liquids by positive displacement
- New features include color coding for easy size recognition, elongated tips to completely empty all standard laboratory tubes and a dispenser box with chute
- Available in nine sizes for use with any Eppendorf Repeater
- Designed for applications requiring precise pipetting of identical amounts of liquids in series



Eppendorf

[www.eppendorfna.com](http://www.eppendorfna.com)

## 8 and 12 Channel Reservoir Trough Plates

- Help improve convenience and productivity in high throughput laboratories
- Hold liquid reagents in precise rows that align with eight channel and 12 channel pipettes allowing researchers to simultaneously aspirate or dispense fluids in all channels
- Lets users improve their speed and precision performing serial dilutions or dispensing different reagents in up to 12 channels

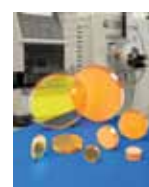


J.G. Finneran Associates

[www.jgfinneran.com](http://www.jgfinneran.com)

## Zinc Selenide (ZnSe) Windows

- Offer a very wide transmission range and can be provided blank, polish finished, and coated for spectrometers and detectors
- Operate over a transmission range from 0.6 to 18 µm, have a very low absorption coefficient of 0.0005/cm @ 10.6 µm, and are non-hygroscopic
- Highly stable in a laboratory environment



Laser Research Optics

[www.laserresearch.net](http://www.laserresearch.net)

## Self-Standing Centrifuge Tubes

- 50mL clear polypropylene (PP) self-standing centrifuge tubes combine ease of use, chemical resistance and high speed tolerance
- Can be spun up to 9400G and will withstand repeated autoclaving at 121°C or long term storage at -20°C
- Supplied in packs of 500 with inner bags of 50 either natural or sterile



Porvair Sciences

[www.epigeneticsexpress.com](http://www.epigeneticsexpress.com)

## pH Electrodes

### pHASE

- Provide accurate and stable pH measurement changes in dynamic process environments under wide ranging variable temperature conditions
- Specially designed for variable temperature operation process testing
- Available in two designs to best suit user needs: the cost-saving, user-friendly sealed design and the Rapid-Renew refillable design, ideal for dirty samples



Sensorex

[www.sensorex.com](http://www.sensorex.com)

## 360 µm High Pressure Fittings

- Permits direct connection of 360 micron OD fused silica, PEEK, stainless, or electroformed nickel tubing without having to use troublesome liners
- Features compact size and fine 2-56 threads
- A leak-free connection that seals at pressures well in excess of 20,000 psi can be easily formed with the available manual tool



VICI Valco

[www.vici.com](http://www.vici.com)



## The new digital BWB XP Flame Photometer

With simultaneous detection and display of all five elements, the BWB XP is easy to setup and use. Hundreds of instruments have been sold and support/servicing is available from offices in the USA, Europe and the Middle East. No costly accessories required... **just add gas!**



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# NEW Avanti J-26S High Performance Centrifuge

## One centrifuge. So many possibilities.

The Avanti J-26S series is the only high performance centrifuge system you'll ever need. Built upon benchmark performance, including high speed, low heat output, imbalance tolerance, and low noise the Avanti J-26S series has been redesigned for your ever-evolving lab and business needs. Its vast range of separations only continues to grow. And its ergonomic design — with lower instrument height and hands-free door operation — remains unchanged. The Avanti J-26S is sustainable, easy-to-use, versatile, and safe.



Find out how the Avanti J-26S can help you get greater control of your lab's workflow at [www.AvantiJ26S.com](http://www.AvantiJ26S.com)

### High performance

Application versatility: can process six liters of fermentor output in less than 10 minutes, deliver a subcellular fraction at 82,000 x g, run 24 microplates at a time, and separate live cell populations with elutriation.

### Lightweight J-Lite rotors

Consistently designed to be the most efficient rotors — for reduced run times and high g-force.

### Ergonomic design

Lower work surface for easier rotor handling. Foot pedal opens the door and improved door design swings up and out of the way.

### Complete BioSafety\* systems

BioCertified\*\* rotors, instruments and labware contain microbiological aerosols, while sterile filters prevent infectious materials from being expelled into the lab environment. Together, they enhance peace of mind for users and lab managers.

### Dual system rotor recognition

Automatically detects which rotor is installed and prevents the rotor from running above its maximum-rated speed — without shutting down the run. All to ensure the safety of your lab.

### Friction Reduction System

Enables quicker, quieter, more energy-efficient runs with better temperature control, which improves system reliability. High-torque, switched reluctance (SR) drive technology shortens cycle times.

### Sustainability is built in

Each instrument saves approximately 9.6 pounds of post-consumer materials from the landfill.

For more information, visit [www.AvantiJ26S.com](http://www.AvantiJ26S.com).

\* BioSafe and BioSafety are terms intended to describe the enhanced biocontainment features of our products.

\*\* BioCertified is a term used to describe our products which have been tested and validated to demonstrate containment of microbiological aerosols by an independent, third party facility (Health Protection Agency, Porton Down, UK or USAMRIID, Ft. Detrick, MD, USA). Improper use or maintenance may affect seal integrity and, thus, containment.

Beckman Coulter, the stylized logo and Avanti are trademarks of Beckman Coulter, Inc. and are registered in the USPTO.



## BioTek Continues to Set the Standard in Microplate Washing with the New 405™ Touch

For nearly 30 years, BioTek has led the market in developing microplate washing technologies, and is well recognized for the industry standard ELx405™ Microplate Washer. As a market leader, BioTek closely interacts with customers, responding to feedback and monitoring market trends. Combining their microplate instrument and software expertise with responsiveness to customer needs, BioTek introduces the 405™ Touch Microplate Washer. This radically new touch screen interface will reshape 96- and 384-well microplate washing routines, and set the microplate washing standard yet again.



P.O. Box 998, Highland Park  
Winooski VT 05404 USA  
Phone: 888-451-5171  
Fax: 802-655-7941  
Email: [customercare@biotech.com](mailto:customercare@biotech.com)  
[www.biotek.com](http://www.biotek.com)

### Touch Screen Interface

A high-resolution, LED backlit touch screen provides the same simple, graphical interface seen in today's mobile devices. This modern interface provides users with enhanced, intuitive custom protocol creation, pre-defined wash protocols, flexible wash process execution and complete instrument maintenance. Users can start their wash process with as few as two screen touches! The touch screen uses resistive technology, so it can be used while wearing gloves. It can also be operated with a pointing device, if preferred. The large 5.7" screen allows open access for programming and viewing comfort.

### USB Ports

Two integrated USB ports allow multiple users to conveniently store, run or transfer programs and settings. Users can operate the 405 Touch from their own personal memory stick via the USB ports, from the touch screen, or from a computer, thus enhancing operator convenience and increasing efficiency.

### Software

The 405 Touch is powered by a fast Intel® processor for immediate instrument start-up and instant command responsiveness. BioTek's Liquid Handling Control™ (LHC™) Software is on-board for complete programming capability and full-color instructional videos provide clear direction on instrument setup and basic use. The context-sensitive Help system provides recommendations, links, diagrams and images and is available at the touch of a finger. LHC Software is also available in a 21 CFR Part 11 compliant version for regulated labs or those simply looking for extra security.

### Legacy Features

The 405 Touch incorporates many of the features of the industry-leading ELx405 washers, including the Dual Action™ manifold for independent control of tube position during filling and evacuation, overflow washing and overflow protection, and the patent-pending Ultrasonic Advantage™ for complete ultrasonic cleaning of salt or protein deposits in the tubes. The 405 Touch brings new features like tool-free quick-change manifolds and optional integrated buffer switching to allow automatic selection of up to four fluids without an external valve module. Several 405 Touch models are available for many applications, including optimized cell washing with gentle, low-flow rates ideal for loosely adherent cell monolayers, vacuum filtration and biomagnetic separation bead-based assays. The 405 Touch can be coupled with BioTek's BioStack™ Microplate Stacker and other robotic systems for unattended batch processing.

For more information on the 405 Touch, visit [www.405touch.com](http://www.405touch.com)



# ACCELERATING 3D MICROTISSUE PRODUCTION

## FAST AND EFFICIENT 3D MICROTISSUE PRODUCTION WITH THE VIAFLO 96 CHANNEL HAND-HELD ELECTRONIC PIPETTE

Preclinical drug development relies on advanced in vitro models with a high degree of standardization to achieve maximal predictivity for an efficient compound de-risking strategy. InSphero's scaffold-free organotypic three-dimensional (3D) microtissue spheroids fulfil these requirements as they can be produced and assayed by standard automated liquid handling systems. The Integra Viaflo 96 Channel Electronic Hand-Held Pipette is perfectly suited to produce 3D microtissues in InSphero's GravityPLUS™ hanging drop plate and to further culture and process them in the GravityTRAP™ platform. Ease of use, versatile programming, and highly accurate tip positioning are the key advantages of the Viaflo 96 pipette which guarantee to perform medium to high throughput screening campaigns with 3D microtissues successfully and with considerable time savings of up to 40% compared to manual pipetting with an 8-channel pipette.

# INTEGRA

2 Wentworth Drive,  
Hudson, NH 03051 USA  
Tel: 1-603-578-5800  
[www.integra-biosciences.com](http://www.integra-biosciences.com)

### 3D MICROTISSES FOR THE ADVANCEMENT OF CELL-BASED ASSAYS

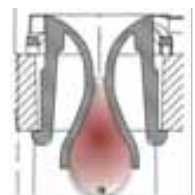


3D cell culture enables the investigation of cellular functions that are usually not observable in «petri-dish-based» culture formats. InSphero offers a variety of scaffold-free microtissues derived either from tumor cell lines, primary cells or iPSCs. These microtissues display a variety of organotypic features which underscores their biological relevance in predicting drug interaction far better than with commonly used cell monolayers:

- Enhanced formation of cell to cell contacts (tight junctions, desmosomes, etc.)
- Extracellular matrix formation
- Polarization of epithelial cells
- Organotypic cell arrangement in co-cultures of parenchymal and non-parenchymal cells
- Altered gene expression profile due to epigenetic regulation

Because of their more pronounced tissue-specific properties and functionality, 3D microtissues are perfectly suited for medium to large scale compound testing as required in the pharmaceutical, cosmetics and chemical industry.

### INSPHERO'S HANGING DROP MICROTISSUE PRODUCTION PLATFORM



InSphero's microtissue production system relies on the hanging-drop cell culture technology, which minimizes the interaction with artificial surfaces and maximizes cell to cell contact mediated by gravity-

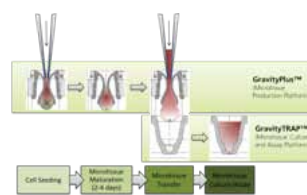
enforced cellular self-assembly. InSphero's patent-pending hanging-drop platform GravityPLUS™ is designed to produce and maintain standardized microtissues in a highly reproducible fashion using standard liquid handling equipment. Each individual well is designed in the shape of two opposed funnel-like structures connected by a capillary, thus creating sufficient adhesive and capillary forces to keep a drop of 35-45 µl stably in place. Microtissues are produced in the GravityPLUS™ plate upon application of a cell suspension of defined cell density from the top. Microtissue formation and maturation in the hanging drop occurs within 2-4 days after seeding depending on cell types used.

### GRAVITYTRAP™: 3D MICROTISSUE RECEIVER AND ASSAY PLATFORM

For extended culture periods and downstream processing (compound treatments, assays), the microtissues can be transferred into the GravityTRAP™ format, which is a specifically designed multi-well plate to accommodate microtissues produced in the GravityPLUS™ system. The GravityTRAP™ offers several key advantages for culturing, manipulating and assaying microtissues:

- No attachment to plastic due to non-adhesive coating
- Transparent clear bottom for visual inspection by inverted bright field or fluorescence microscopy
- Safe medium replacement without risk of microtissue loss

The transfer of microtissues from the GravityPLUS™ into the GravityTRAP™ platform can be achieved simply by supplying sufficient medium to the already existing hanging drop, which eventually falls into the well of the aligned GravityTRAP™ underneath carrying along the microtissue.



The above figure illustrates the sequence of 3D microtissue seeding, formation and maturation in the GravityPLUS™ plate with subsequent transfer into the GravityTRAP™ format for long term culture and experimental procedures.

### VIAFLO ELECTRONIC 96 CHANNEL HAND HELD PIPETTE

Viaflo 96 is a 96-channel pipette, which was designed to resemble hand held pipetting and to increase productivity at the same time. The pipette is guided by hand but movements are assisted by motors for effortless and ergonomic working.

Viaflo 96 is used to transfer reagents and samples from a reagent reservoir to 96 and 384 well plates or from plate to plate. Up to 96 samples can be transferred at once.

To reformat 96 well plates to 384 well plates, the plate holder can be shifted to quickly accommodate all wells of a 384 well plate.

Viaflo 96 covers a large volume range of 0.5 µl to 1250 µl with four interchangeable pipetting heads. These heads are changed within seconds to optimally adapt Viaflo 96 to the application currently performed.

For delicate pipetting operations, such as the transfer of microtissues, several user-defined position settings can be used. This allows automatic guidance into the wells but also to set a specific z-height. The z-height sets a minimum height above a plate and assures that all subsequent transfers are performed at the same height to guarantee highly reproducible pipetting results

# PURELAB flex- innovating water purity

ELGA's new innovative Type I ultrapure water purification system ensures accurate consistent results. The PURELAB flex 3 & 4 are the latest additions to the award winning PURELAB flex range of systems. Both systems deliver up to 10 liters of ultrapure water per day and up to 2 liters per minute. The PURELAB flex 3 delivers ultrapure water direct from potable tap water and PURELAB flex 4 requires a pre purified feed.

The PURELAB flex offers many advantages for analytical and lifescience applications. It allows users to focus on routine test work, without having to worry about the water quality affecting any test results. The PURELAB flex 3 and 4 are flexible water purification systems which can be adapted to respond to a laboratory's changing water purity needs today and tomorrow.

# ELGA

5 Earl Court  
Woodridge, IL 60517  
(877) 315-3542  
Email: [elga.usa@veoliawater.com](mailto:elga.usa@veoliawater.com)  
[www.elgalabwater.com](http://www.elgalabwater.com)

The water quality conforms to international water standards e.g. CLSI, CLRW, ISO 3696: Grade 1,2,3, ASTM D1193-06, Pharmacopeia USP, EP and JP. The PURELAB flex can be used for analytical and lifescience applications in all pharmaceutical, university, hospital, food and beverage laboratories.

The PURELAB flex is easily adaptable to facilitate changes to laboratory design layouts and applications.

## Handset designed for today's laboratory

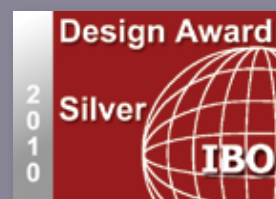
- Intuitive to use
- Ergonomic handset design
- Clear water purity for absolute confidence as you dispense
- Handset displays prioritized information shown at all times (system status, TOC, alarm)
- POU filters for multiple applications to remove endotoxins, DNase, RNase and bacteria
- Flexible dispensing in four different ways
  - o Variable flow — drop by drop or up to 2 liters per minute
  - o Autovolume dispense from 50ml to 60ml and repeat dispensing
  - o Hands free with optional foot pedal
  - o Locked dispense for glassware filling

## Water Purification made easy

- Fast and simple sanitization to minimize microbial growth
- Data capture via USB port for system validation
- User settings can be customized via the web and uploaded using the USB port in seconds
- Multiple dispense positioning
  - o Wall, bench, height adjustable arm, hand-held dispensing



▲ The PURELAB flex delivers 18.2 MΩ-cm water quality.



**ELGA is the global laboratory brand name of Veolia Water Solutions and Technologies, the world's leading water service company.**





## A Free Online Management Tool

**Problem:** Did somebody order more dNTPs? Where is the p53 antibody? Every day, simple questions like these disrupt workflow and distract researchers from their experiments. Labs that spend billions of dollars on chemicals, biologics and supplies hack together disparate solutions to their organizational problems using tools such as Excel or Filemaker. Ordering is done with a hodgepodge of email, white boards, or Post-Its. Factor in the increasing competition for grant dollars, growing emphasis on collaboration, and incredible pressure to make discoveries faster, and all that wasted time on organizational issues can be the difference between success and failure.

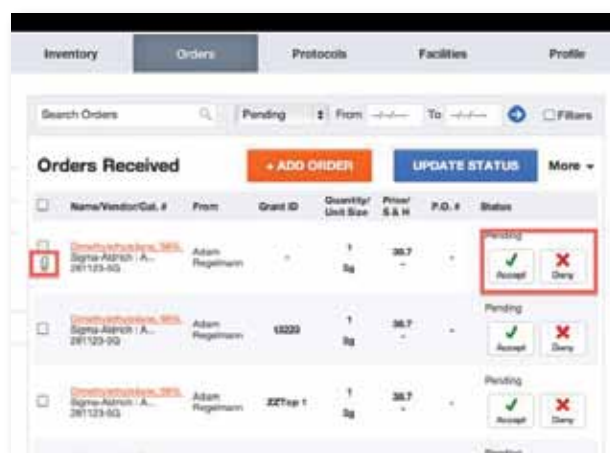
**Solution:** Several solutions have recently hit the market to help increase lab efficiency. One such option is the free Quartzzy website. The site—[www.quartzzy.com](http://www.quartzzy.com)—offers free laboratory management software to organize and streamline lab processes—making it possible to maintain lab inventory, keep records of orders, and reserve time on expensive shared equipment like PCR machines, flow cytometers, or microscopes—all with a click of a button.

Products such as Quartzzy allow researchers to focus on their work instead of mundane tasks, increase productivity, decrease costs, and easily scale from a lab of as little as three people to an entire institution.

Quartzzy in particular has four modules to achieve that greater productivity. The *Orders* module allows for a one-click interface where scientists can send orders to lab managers (or other administrators) who can quickly and easily act and respond. This module also ensures that the entire lab order history is in one place. And when ordered items are delivered, they are automatically placed into Quartzzy's *Inventory* module. The *Inventory* module helps securely manage chemicals, reagents, lab supplies, and even experimental samples. Scientists can see who has what and where it is. It is very easy to start using the *Inventory* module through the product's simple way to upload existing inventory spreadsheets. Additionally, Quartzzy links with hundreds of thousands of vendor items so researchers can quickly search and place an item into their own inventories. The *Facilities* module helps scientists manage sign-ups online, get email reminders, and download usage reports for shared equipment like microscopes and flow cytometry machines. Lastly, a *Protocols* section allows for the group to easily share lab protocols—so everybody is on the same page.

Quartzzy is free to use because it generates revenue through its marketplace. Instead of charging the researchers as traditional online lab management tools do, Quartzzy charges vendors to host catalogs or sell products on the site. Over 11,000 researchers in both industry and academia currently use Quartzzy to manage their labs.

Whether you are looking for help with lab management, project management, hazardous chemical tracking, or data analysis, there is an ever-expanding library of online solutions from which to choose—all designed to help decrease costs and increase the pace at which science is done. The labs that streamline their processes and move to systems like Quartzzy could stay a step ahead of the rest.



▲ Orders can be accepted or denied by the PI or lab manager using the Quartzzy website.

# Buffer Creation Wizard

**AUTOMATE YOUR BUFFER PREPARATION WITH THE  
TECAN BUFFER CREATION WIZARD**



Seestrasse 103  
8708 Männedorf, Switzerland  
Tel: +41 44 922 81 11  
[www.tecan.com](http://www.tecan.com)

The Buffer Creation Wizard is a Freedom EVOware® Add-on and allows the fully automated preparation of your set of buffers e.g. for subsequent screening experiments like High Throughput Process Development.

The user can import a \*.txt file with the final buffer layout which has been generated by a Design of Experiment (DoE) software. The Wizard guides the user through six steps for entering all necessary information for the process such as used stock solutions and destination plate or tubes. All stock solutions and their key features are administrated in a data base.

The algorithm of the Buffer Creation Wizard calculates the required volumes of each stock solution for every single destination cavity. The total required volumes are summarized and provided in a 'Shopping List' which facilitates the preparation of the worktable.

Finally the Wizard generates a ready-to-run Freedom EVOware script which can be saved and run at any time.

*The applications described here are not available in the US outside of the research market.*





## Application Specific Sensors for Bioprocess Control

**Problem:** The bioprocessing industry is advancing the capability to monitor and control its manufacturing systems. Initiatives such as the US Food and Drugs Agency's Process Analytical Techniques program and Quality by Design (QbD) are driving these changes as are demands for higher yielding, more repeatable and predictable processes.

To date, process monitoring and control has been separated into two primary methodologies.

Firstly, off-line analytical techniques such as spectroscopy have been used to determine the chemical composition of the media contained in the reactor vessel. The results accurately reflect the process, however, the skill required to obtain, prepare and analyze samples is significant and the elapsed time from sample extraction to presentation of results may, in fact, mean that the data is historical rather than current. Typically, samples are taken at timed intervals throughout the process run and are therefore 'snapshots' rather than a dynamic indication of the process's actual status. Finally, the technique requires a physical sample to be removed from the reactor vessel, increasing the risk of contamination and batch rejection.

The alternative approach, although often used in conjunction with analytical techniques, is to use in-situ, real time sensors to determine specific physical characteristics such as temperature, pH value or dissolved oxygen (DO). These application-specific sensors are well suited to the requirement for dynamic process data, however, they typically provide only a single process parameter and give little indication of the chemical characteristics of the process media.

An ideal solution to improve process monitoring and control would be to provide real-time, in-situ sensors which indicate the dynamic state of the process media.

Refractive Index (RI) instruments, known as refractometers, have been employed in a range of benchtop bioprocess applications to determine media concentrations, for example. More recently these optical devices have been deployed in relatively small numbers in in-line applications. 'In-line' indicates connection to the reactor vessel media via parallel pipework rather than the more desirable 'in-situ' where the sensor is in direct contact with the process media. Whilst their performance and sensitivity have been adequate, the size, governed by free space optics, and cost of these sensors have inhibited mass deployment either in small process development systems or in manufacturing vessels where physical robustness is also a consideration. Refractive Index has therefore been accepted as a measurement technique however, the current physical implementation and costs are prohibitive.

**Solution:** One solution to the demand for dynamic process information has been developed by a UK company called Stratophase. Working with solid state silicon and fiber optic technology originally developed for mass market telecommunications, the company has developed the first refractive index sensor which is truly optimized for real-time, in-situ process monitoring and control. Stratophase has developed a manufacturing method which routes light around a small silicon chip that sits within the reactor vessel. The sensor measures the refractive index of the media directly and dynamically monitors metabolic rates, the effects of nutrient additions and the end of process. Where the process calls for nutrient feeds throughout its run time, known as fed-batch, the sensor can be used to determine the optimal feeding regime. The data is automatically generated in real-time. In addition to its performance characteristics the simple structure of the sensor means that it is lower cost and physically robust, making it a good fit for mass deployment in both development and manufacturing.

Product development is now complete and the company has installations at a number of corporate launch sites.

In summary, the application-specific development of the Stratophase sensor makes it a suitable option for processes ranging from biofuel to mammalian cell culture and in media monitoring, media preparation and fill and finish.

For more information, visit <http://www.stratophase.com/>



▲ Stratophase refractive index media sensor



## A Modular and Customizable Automation Solution

**Problem:** With the vast majority of drug discovery research facilities and a growing number of academic laboratories now utilizing automated workflows, the ability to safely move plates from one instrument to the next is vital to ensure the efficient progression of the protocol. Plate movers are therefore key components in any automated lab.

**Automated workflows streamline processes to maximize productivity by substantially reducing the user input and time needed to complete the required task. As automation can be utilized for more and more processes, larger, increasingly complex workflows can be undertaken. However as the majority of the plate movers currently available are stationary, they have limited reach. This restriction impacts on the number of instruments and storage units that can be placed around the mover, constraining the size, complexity and customization of the required automated workflow. The inability to reach instruments essential for the efficient progression of the protocol is a limiting factor in the development of automated systems, as it reduces the hands-off time that would be available for other research tasks.**

**Solution:** In order to support an enhanced and more complex workflow, the plate mover ideally needs to be able to access all the instruments within the workflow. The Thermo Scientific Orbitor BenchTrak significantly extends the functionality and versatility of the existing Orbitor™ RS plate mover by incorporating a track that the Orbitor can move freely along. This not only extends the reach of the mover, but also means that more instruments can be accessed and utilized within a given process. The Orbitor BenchTrak can be easily incorporated into an existing Orbitor system set-up or laboratory space as either an “on-bench” or “in-bench” component. Therefore it addresses almost any workflow requirement, including sample preparation, ELISA, nucleic acid and protein purification, cell or biochemical assays, qPCR and next generation sequencing, all of which can be carried out alone or in combination. To provide a completely unique and flexible automation solution, the fully customizable mover can connect to a range of “click-in” components, such as instrument loading platforms, mezzanines, guarding and microplate stores, as well as additional tracks. This enables a large, fully automated workflow to be carried out, reducing the need for user input, which in turn enhances productivity.

In order for plate movers to effectively carry out their function within a workflow, they need to be taught the location of instrument nests and plate storage devices. This can be a difficult, time consuming, and complex undertaking often requiring input from specialist automation technicians. The Thermo Scientific LOCamotion software, supplied as standard with the Orbitor BenchTrak, guides users through the steps required to teach the plate movers. The need for an automation technician is therefore eliminated and valuable time is saved. Furthermore, the automation control

and scheduling Thermo Scientific Momentum 3 software integrates all of the required processes in a given protocol. It configures the Orbitor BenchTrak and other devices, enabling multiple users to operate continuously, maximizing the flexibility and productivity of the workflows, while providing complete walk-away functionality and user peace of mind.

Together the Orbitor BenchTrak, LOCamotion™ and Momentum™ 3 software can support a variety of processes enabling the control and movement of plates in large, complex, fully customized automated workflows.

For further information visit [www.thermoscientific.com/orbitor](http://www.thermoscientific.com/orbitor)



▲ *The Thermo Scientific Orbitor BenchTrak extends the functionality and versatility of the Orbitor RS plate mover.*





## A Dispensing and Diluting System

**Problem:** Preparing samples for analysis can be a tedious, time-consuming process that is often seen as too small to automate. In a wide range of industries including environmental, forensic toxicology, mining and metals and food and beverage, concentrated samples must be diluted prior to analysis by techniques such as HPLC, GC, AA or ICP. Sample prep is traditionally carried out manually, using handheld air displacement pipettes or syringes and volumetric glassware, and these techniques have a number of drawbacks including time requirements, sample waste and variations in accuracy.

With traditional air displacement pipettes, compressible air is trapped in the fluid path. When liquid is moved into the path, this air is compressed, causing results that vary with atmospheric conditions, sample viscosity, and the operator's technique. Accuracy therefore varies from user to user. Volumetric glassware must be cleaned between uses, which takes time. As is the case with every analytical process, lab managers are looking for ways to improve results and save time and money.

**Solution:** The Hamilton Microlab 600 was designed to carry out a range of dispensing and diluting routines in the lower throughput lab. With a positive displacement pump that functions independently of solution viscosity and atmospheric pressure, the Microlab 600 is one sample prep option that can be used by multiple analysts for a range of routines, delivering consistent, accurate volumes. The positive displacement system delivers better than 99 percent accuracy.

The Microlab 600 positive displacement system is primed with liquid that is not compressible, so each time the syringe aspirates or dispenses the liquid is accurately measured.

The system's dual syringe diluter configuration uses two syringes to create up to a 1:50,000 dilution in a single step, reducing preparation time and wasted buffer. The diluent washes the tubing between each sample, minimizing carryover. Hamilton's proprietary Bubble Free Prime (BFP) syringes eliminate trapped air bubbles and solvent to speed priming and solvent changes, while a universal valve enables users to quickly switch from one task to another with minimal downtime.

The Microlab 600 controller integrates a streamlined user interface with a large touchscreen display. Dilutions, dispenses, titrations and more are visually displayed in real time with the touch of a button. A package of compliance features for labs in regulated environments, such as forensics and pharmaceutical, includes method logging with electronic signature capability, password protection and the ability to print documentation. These functions are tamper-evident for additional security and adhere to 21 CFR Part 11 and FDA GLP/GMP requirements. The most recent Microlab 600 software, which is field-upgradable and included in all new instruments, is now available in ten languages.

A recent comparative study demonstrated measurable cost savings using the Microlab 600 compared to volumetric glassware and pipettes. The Microlab 600 is roughly four times faster than volumetric glassware and uses just one-tenth the reagent. Cost savings compared with air displacement pipettes are not as dramatic, but accuracy and consistency are higher. The precision meets or exceeds that of Class A glassware, especially when operator variability is considered.

The easy-to-use Microlab 600 is an option that delivers a basic level of automation, along with a combination of technologies that can improve analytical sample preparation while reducing costs.

For more information, visit <http://www.hamiltoncompany.com/Diluters/>



▲ Hamilton Company's Microlab 600 Dual Syringe Diluter.

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# PARTING POINTS

## Takeaways from this month's issue:



### SOCIAL MEDIA GONE VIRAL

Twitter, Facebook, and the like have insinuated their way into every nook and cranny of society—labs included. Social media is becoming more and more important in the sciences. Recent trends include:

- Social media increasingly influences scientists' decision making
- Niche social media sites attract clusters of scientific professionals
- Science depends more on digital technologies to communicate and convey
- Social platforms abet research too

10



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### NO BOUNDARIES

Collaboration across organizational and political boundaries and across large distances is increasingly a business necessity for firms to prosper and grow, and even to survive. Some tips for effective management of distant groups include:

- Using social media to create a sense of community
- Have one overall leader and sub-leaders for each team involved
- Carefully write the contract between distant firms to mitigate potential risks
- Ensure any cultural differences are well understood beforehand



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### COMPETITIVE ADVANTAGE

The digitization of data [big data] has made it possible to identify collaboration partners and subsequently execute the outsourcing and offshoring of services and commodities as never before. Advantages of big data collaboration include:

- Reduction of costs
- Retention and attraction of talent
- Finding solutions to complex issues
- Better connections with your customers



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### REPAIR, MAINTENANCE, AND CALIBRATION, OH MY!

Designing the most cost-effective and efficient instrument service program requires careful consideration. Four instrument service models are available, along with a fifth (the integrated model) that is a blend of the first four:

- In-house Metrology Model
- Service Consolidator Model
- Independent Service Organization Model
- Original Equipment Manufacturer Service Model



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### TRENDS IN NEXT-GEN SEQUENCING

George Weinstock, Ph.D., professor of Genetics and Molecular Microbiology at Washington University, shares his knowledge of evaluating new instruments to guide sequencing users on what they should look out for as they strive to meet budgets while increasing productivity:

- Avoid being too influenced by the marketing of sequencing instruments
- Get help from the investigators you work with when choosing an instrument
- Upgrading instrumentation is essential to stay on top
- Proper sample and data management is critical no matter what instrument you choose

# How to Find and Fix the Top 8 Lab Chemical Management Errors



## Speaker

Jon Webb  
*Technical Specialist/Inventory Consultant*

Effective inventory management involves getting the right inventory to the right place at the right time. For the lab, that means having the right compound at the right workbench in the right amount when the material needs to be used for research.

When a lab's chemical inventory management is out of control, the inventory data is inaccurate and chemicals won't be on hand or in the correct location – causing confusion on the lab bench and often non-compliance with numerous regulations.

Companies that utilize chemicals in their labs and their manufacturing processes must manage those chemicals in a safe environment. To do this, a system for managing information about the chemical inventory and safety data should be established and maintained.

Jon Webb leverages his application expertise at ChemSW to assist organizations around the world in optimizing and streamlining their chemical inventory management activities. Jon has a degree in Biology from Eastern Washington University in Spokane, Washington.

## Attendees will learn how to:

- Optimize chemical safety and inventory data
- Automate audit trails and regulatory reports
- Manage and mitigate the amount of chemicals on-site
- Reduce inventory management costs

Examples of successful implementations and case studies will be provided.

**TUNE INTO OUR LIVE WEBINAR** to hear Jon discuss how to find and fix the eight most common chemical management errors to ensure consistent, accurate, real-time chemical data that streamlines lab workflows while lowering costs.





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