

## **New Product Innovation Award Biopharmaceutical Research Tools North America, 2011**

### **Frost & Sullivan's Global Research Platform**

Frost & Sullivan is in its 50th year in business with a global research organization of 1,800 analysts and consultants who monitor more than 300 industries and 250,000 companies. The company's research philosophy originates with the CEO's 360 Degree Perspective™, which serves as the foundation of its TEAM Research™ methodology. This unique approach enables us to determine how best-in-class companies worldwide manage growth, innovation and leadership. Based on the findings of this Best Practices research, Frost & Sullivan is proud to present the 2011 North American New Product Innovation Award in Biopharmaceutical Research Tools to Hewlett-Packard Development Company, L.P. (HP).

### **Key Industry Challenges**

According to Frost & Sullivan's research, the North American biopharmaceutical research industry is presently undergoing a major consolidation process. With major biopharmaceutical research facilities selling off their assets and equipment, the industry is witnessing a steady decline. Such a scenario has led to a serious lack of technological innovation. In Frost & Sullivan's opinion, small and medium biopharmaceutical research companies are amongst the worst hit as the absence of new and creative technology is restraining their growth in this challenging market environment. While the challenging market environment has led to a significant demand for new and improved biopharmaceutical research tools, which demand has largely remained unmet.

Frost & Sullivan feels the conventional analog technology (pipetting) and technique (serial dilution) currently used in drug titration faces several key shortcomings. Firstly, it takes a considerable amount of expertise to use the conventional instruments available on the market today. A large number of laboratories employ inexperienced technicians who require multiple days of training to learn and efficiently operate an automated titration instrument or to conduct manual titration via hand pipettes. Secondly, the conventional titration process can be extremely time-consuming. With the complexity of calculations, programming, dispense operations, and work flow coordination, automated or manual titration can take hours or even days. Thirdly, conventional analog processes also result in loss of materials and chemicals, leading to unnecessary product expenditures. All told, the process of drug development has become excessively time consuming and costly. Finally, where reliable quality should be paramount in drug discovery, conventional analog titration by serial dilution has non-standardized protocols and known quality issues related to its numerous steps, cumulative errors, precipitation and other variability per compound properties.

Due to the drawbacks associated with conventional approaches to titration, the biopharmaceutical industry needs novel and improved technologies that can help alleviate

the pressures associated with developing new therapeutics. The absence of innovative solutions that accelerate critical drug development processes has created a significant burden for pharmaceutical companies, biotechnology companies, and contract research organizations. Laboratories within these sectors are, therefore, forced to seek new biopharmaceutical research tools in order to help revitalize the industry.

In order to address market challenges associated with biopharmaceutical research tool needs, technology developers must focus on developing creative and innovative solutions to simplify and accelerate the critical processes involved in drug development. These new and innovative research tools should enable faster turnaround times of good, reliable data while requiring less expertise to operate. Frost & Sullivan firmly believes that the technology developer most successful at addressing these challenges will enable biopharmaceutical companies to accelerate their growth rates in a slowing industry.

### **Impact of New Product Innovation Award on Key Stakeholders**

The New Product Innovation Award is a prestigious recognition of Hewlett Packard's accomplishments in biopharmaceutical research tools. An unbiased, third-party recognition can provide a profound impact in enhancing the brand value and accelerating HP's growth. As captured in Chart 1 below, by researching, ranking, and recognizing those who deliver excellence and best practices in their respective endeavors, Frost & Sullivan hopes to inspire, influence, and impact three specific constituencies:

- **Investors**

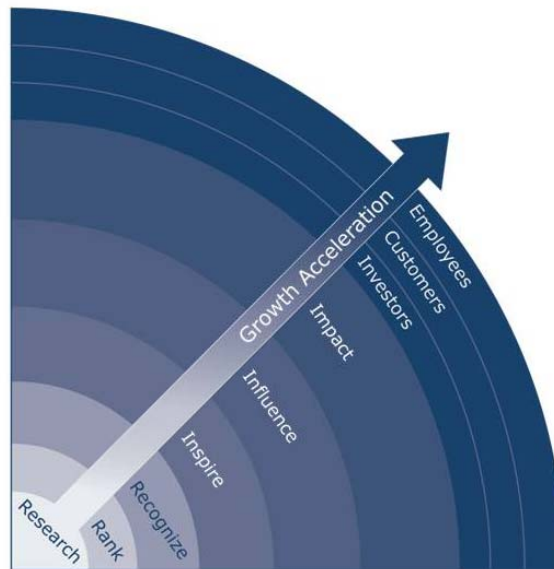
Investors and shareholders always welcome unbiased and impartial third-party recognition. Similarly, prospective investors and shareholders are drawn to companies with a well-established reputation for excellence. Unbiased validation is the best and most credible way to showcase an organization worthy of investment.

- **Customers**

Third-party industry recognition has been proven to be the most effective way to assure customers that they are partnering with an organization that is leading in its field.

- **Employees**

This Award represents the creativity and dedication of HP's executive team and employees. Such public recognition can boost morale and inspire the team to continue its best-in-class pursuit of a strong competitive position for HP.

**Chart 1: Best Practices Leverage for Growth Acceleration**

### Key Benchmarking Criteria for New Product Innovation Award

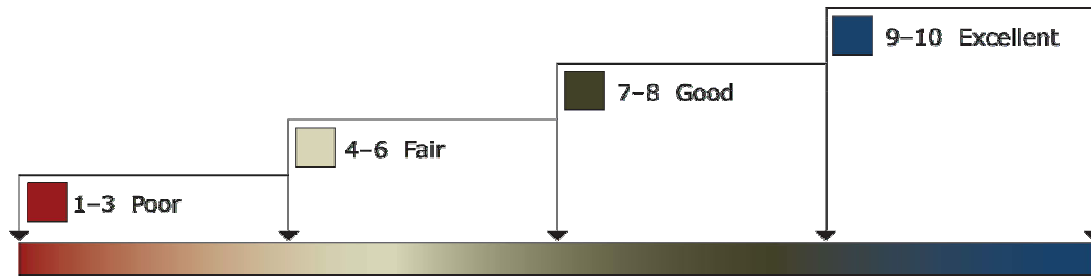
For the New Product Innovation Award, the following criteria were used to benchmark HP's performance against key competitors:

- Innovative Element of the Product
- Leverage Leading Edge Technologies in Product
- Value Added Features/Benefits
- Increased Customer ROI
- Customer Acquisition/Penetration Potential

### Decision Support Matrix and Measurement Criteria

To support its evaluation of best practices across multiple business performance categories, Frost & Sullivan employs a customized Decision Support Matrix (DSM). The DSM is an analytical tool that compares companies' performance relative to each other with an integration of quantitative and qualitative metrics. The DSM features criteria unique to each Award category and ranks importance by assigning weights to each criterion. The relative weighting reflects current market conditions and illustrates the associated importance of each criterion according to Frost & Sullivan. Fundamentally, each DSM is distinct for each market and Award category. The DSM allows our research and consulting teams to objectively analyze each company's performance on each criterion relative to its top competitors and assign performance ratings on that basis. The DSM follows a 10-point scale that allows for nuances in performance evaluation; ratings guidelines are shown in Chart 2.

**Chart 2: Performance-Based Ratings for Decision Support Matrix**



This exercise encompasses all criteria, leading to a weighted average ranking of each company. Researchers can then easily identify the company with the highest ranking. As a final step, the research team confirms the veracity of the model by ensuring that small changes to the ratings for a specific criterion do not lead to a significant change in the overall relative rankings of the companies.

**Chart 3: Frost & Sullivan’s 10-Step Process for Identifying Award Recipients**



## Best Practice Award Analysis for HP

The Decision Support Matrix, shown in Chart 4, illustrates the relative importance of each criterion for the New Product Innovation Award and the ratings for each company under evaluation. To remain unbiased while also protecting the interests of the other organizations reviewed, we have chosen to refer to the other key players as Competitor 1 and Competitor 2.

**Chart 4: Decision Support Matrix for New Product Innovation Award**

<i>Measurement of 1–10 (1 = lowest; 10 = highest)</i>	<b>Award Criteria</b>					
	Innovative Element of the Product	Leverage Leading Edge Technologies in Product	Value Added Features/Benefits	Increased Customer ROI	Customer Acquisition/Penetration Potential	<b>Weighted Rating</b>
<b>Relative Weight (%)</b>	<b>20%</b>	<b>20%</b>	<b>20%</b>	<b>20%</b>	<b>20%</b>	<b>100%</b>
<b>HP</b>	<b>9</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>9.8</b>
Competitor 1	9	7	8	8	7	7.8
Competitor 2	9	6	7	5	6	6.6

### Criterion 1: Innovative Element of the Product

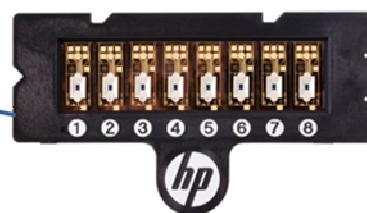
HP, a multinational information technology company, enjoys a significant presence in the biopharmaceuticals and life sciences industries as a leading supplier of computing, data storage, and networking hardware, as well as service and support. For the first time, the company is leveraging its market-leading inkjet technology outside of printing to the development of a high-performance dispensing system for drug discovery. In Frost & Sullivan's opinion, this novel and game-changing product—the Digital Dispensing System—is set to create new standards in the area of titration of drug compounds. This unique instrument, which has recently achieved market launch in U.S. and Europe in September 2011, consists of an HP D300 Digital Dispenser, an HP T8 Dispensehead Cassette, and HP Digital Dispensing Software. The Digital Dispensing System is designed to address the major challenges associated with conventional titration processes: inaccuracy, sub-optimal data quality, low productivity, high waste, high time-consumption, complexity, and high cost. Unlike analog titration, HP's Digital Dispensing System ensures quick, accurate, and error-free results. Frost & Sullivan's research shows that the system significantly simplifies the process of titration through digital dispensing.

"Digital" dispensing has similarities with the bits, bytes, kb and Mb that have transformed other industries from computation to music to commerce. Digital dispensing starts with adding little bits rapidly across vast dynamic range: in this case picoliters, from one droplet to microliters per second, which is the low nanoMolar to high-micorMolar dosage range of a typical drug titration. Compare this with analog titration by two-fold dilution in DMSO and then aqueous and daughter dilutions. In comparison, digital titration simplifies the math and workflow: and it improves titration fidelity, flexibility and end-user experience. Digital titration increases the process productivity by more than ten times and decreases costly wastage by up to 90 percent. Moreover, it ensures a shortened and simplified process that requires little operational expertise and limited training to nonetheless obtain the highest quality results. End-users simply set up the software, place the cassette in the Dispenser, manually pipette a few microliters of the drug sample, and dispense from picoliters to microliters directly into microtiter plates. The instrument supports high quality and creative drug discovery research targeted at generating highly valuable data. Although it addresses the need of a niche application, it forms the pillar of the drug discovery process. Accordingly, Frost & Sullivan expects the Digital Dispensing System to radically disrupt conventional workflows and displace the conventional technologies in the drug titration space. With an aim to accelerate the discovery of better drugs, HP has designed a product that targets a wide range of applications for varied biopharmaceutical customers, especially biologists working at the bench. HP's empowerment of bench scientists is reminiscent of HP's historical market disruption with handheld calculators and desktop printers.

**HP D300 Digital Dispenser**



**HP T8 Dispensehead Cassette**



### **Criterion 2: Leverage Leading Edge Technologies in Product**

Frost & Sullivan recognizes that HP developed the Digital Dispensing System leveraging its inkjet printing technology, a ubiquitous technology in printing and imaging that jets ink droplets on a sheet of paper. However, instead of ink and paper, HP has applied this proven and immensely successful technology to the dispensing of non-ink fluid onto a

non-paper media. Replacing the ink and paper are customer-supplied research drugs and microtiter well plates. The system's T8 Dispensehead Cassette has a series of eight individual receptacles where the user manually pipettes a few microliters of research drug sample and, using the technology, dispenses picoliters to microliters directly into bioassay wells. The system's Dispensing Software enables digital dispensing of the drug, which drastically reduces the time necessary for a titration process. Presently, the system allows dispensing into 384 and 96 well plates.

### **Criterion 3: Value Added Features and Benefits**

From Frost & Sullivan's perspective, the Digital Dispensing System is set to create new dimensions in drug titration through its exceptional functionalities and benefits. This instrument, developed by repurposing the highly advanced inkjet printing technology, largely simplifies and accelerates the process of drug titration. As the drug concentrate is directly dispensed into bioassay plates, the system eliminates the intermediate and serial steps, thus significantly reducing manual labor, processing time and delays. For instance, using this system, titrating an entire 96 or 384 microtiter plate can be done within minutes even when including the time for setting and programming the instrument. The process of digital titration also ensures reliable and accurate results, even when employed for highly advanced and complex experiments. Using the HP Digital Dispensing Software, the end-user can program the most valuable layouts, including complex ones such as randomized layouts or drug combination experiments. For example, using this system, one compound can be titrated by rows while a second compound can be titrated by columns, thus composing a set of doses. Driven by such simple operations, any biologist can be trained to operate the system efficiently within minutes, whereas conventional titration processes may require days of training for a biologist to be proficient. Along with simplifying the entire workflow, it also helps to conserve valuable compounds. Unlike conventional titration processes, Frost & Sullivan finds that HP's Digital Dispensing reduces unnecessary wastage by up to 90 percent. Hence, using HP's Digital Dispensing System can help end-users drastically improve their productivity by efficiently streamlining their drug discovery processes.

### **Criterion 4: Increased Customer ROI**

HP designed its Digital Dispensing System to address the requirements of routine IC50 generation in low/medium-throughput biology labs and extremely advanced and complex drug discovery experiments. The rising demand for high-quality biopharmaceutical research and drug discovery has given rise to an enormous demand for advanced titration tools. Because conventional titration methods are highly tedious, time consuming, and error prone, biopharmaceutical research facilities seek a digital titration system that facilitates a quick, accurate, and simple drug titration process. For such facilities, HP's Digital Dispensing System is an ideal choice as it helps improve productivity while reducing costs associated with titration time, drug compound material, and labor. When a

biopharmaceutical laboratory can not complete a drug titration process within the specified time period and the medicinal chemist fails to get timely results, there are adverse impacts to the downstream workflow, critical decision making, quality, and overall productivity. Such opportunity costs can be eliminated by replacing conventional analog titration systems with HP's Digital Dispensing System. Frost & Sullivan expects this system to highly enhance the end-user experience in the drug discovery with an unprecedented return on investment for the biopharmaceutical industry.

### **Criterion 5: Customer Acquisition and Penetration Potential**

HP generates billions of dollars in annual revenues from its IT sales to the medical sector and life sciences space. Leveraging the company's strong position with this customer base, Frost & Sullivan anticipates HP's new Digital Dispensing System will attract huge market attention with its revolutionary technology and extraordinary product performance. HP has partnered with the Tecan Group, Ltd. (Tecan) to commercialize this product. Tecan is a leading vendor of advanced research tools and laboratory instruments for biopharmaceutical and clinical applications. It boasts an impressive customer base of pharmaceutical companies, diagnostic laboratories, and other research facilities. Leveraging this partnership, HP will have access to the large customer base of Tecan in the biopharmaceutical research industry. Tecan's rich expertise in this field makes it the ideal choice for the distribution of HP's new Digital Dispensing System. Frost & Sullivan firmly believes that the Digital Dispensing System is ripe for market adoption: the product concept was first introduced at the MipTec Conference four years ago and HP has successfully been building anticipation for the product's launch even since. HP has been working methodically to ensure the Digital Dispensing System addresses market needs while testing the product with some key customers, including GlaxoSmithKline and SIGA Technologies. Given the remarkably positive feedback, Frost & Sullivan predicts that HP's Digital Dispensing System will become the preferred titration instrument in the biopharmaceutical research tools market.

### **Conclusion**

HP, a global technology provider, developed a revolutionary titration technology: the Digital Dispensing System. This standalone instrument is designed to address the continual challenges faced by the biologists who perform conventional analog titration. Using this unique system, end-users can now achieve high accuracy and increased productivity in less time and at a lower cost. End-users can also employ more advanced dose-response strategies than ever before. HP has partnered with Tecan to commercialize and distribute this product to the global market. Through this partnership, HP's high degree of innovation, technological expertise, and product leadership is brought together with Tecan's extensive customer base in the biopharmaceutical industry. For developing a high-performance, advanced, and commercially viable product, Frost & Sullivan has



selected HP as the worthy recipient of the 2011 North America New Product Innovation Award in Biopharmaceutical Research Tools.

## The CEO 360-Degree-Perspective™ - Visionary Platform for Growth Strategies

The CEO 360-Degree-Perspective™ model provides a clear illustration of the complex business universe in which CEOs and their management teams live today. It represents the foundation of Frost & Sullivan's global research organization and provides the basis on which companies can gain a visionary and strategic understanding of the market. The CEO 360-Degree-Perspective™ is also a “must-have” requirement for the identification and analysis of best-practice performance by industry leaders.

The CEO 360-Degree-Perspective™ model enables our clients to gain a comprehensive, action-oriented understanding of market evolution and its implications for their companies' growth strategies. As illustrated in Chart 5 below, the following six-step process outlines how our researchers and consultants embed the CEO 360-Degree-Perspective™ into their analyses and recommendations.

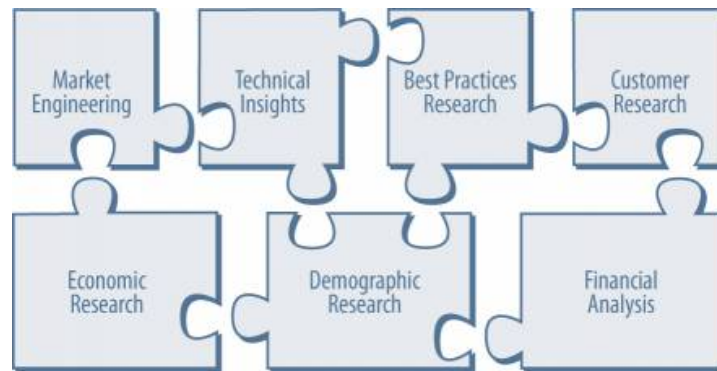
**Chart 5: How the CEO's 360-Degree-Perspective™ Model**



## Critical Importance of TEAM Research

Frost & Sullivan's TEAM Research methodology represents the analytical rigor of our research process. It offers a 360 degree view of industry challenges, trends, and issues by integrating all seven of Frost & Sullivan's research methodologies. Our experience has shown over the years that companies too often make important growth decisions based on a narrow understanding of their environment, leading to errors of both omission and commission. Frost & Sullivan contends that successful growth strategies are founded on a thorough understanding of market, technical, economic, financial, customer, best practices, and demographic analyses. In that vein, the letters T, E, A and M reflect our core technical, economic, applied (financial and best practices) and market analyses. The integration of these research disciplines into the TEAM Research methodology provides an evaluation platform for benchmarking industry players and for creating high-potential growth strategies for our clients.

**Chart 6: Benchmarking Performance with TEAM Research**



## About Frost & Sullivan

Frost & Sullivan, the Growth Partnership Company, enables clients to accelerate growth and achieve best-in-class positions in growth, innovation and leadership. The company's Growth Partnership Service provides the CEO and the CEO's Growth Team with disciplined research and best-practice models to drive the generation, evaluation and implementation of powerful growth strategies. Frost & Sullivan leverages 50 years of experience in partnering with Global 1000 companies, emerging businesses and the investment community from more than 40 offices on six continents. To join our Growth Partnership, please visit <http://www.frost.com>.