Addressing Pharma's
$40 Billion C hallenge

With **A MAJOR GAP IN ITS PIPELINE** of potential replacement blockbusters, the pharmaceutical industry is **FACING A CRISIS**.

IN AN EXCLUSIVE TO PHARMAVOICE, MICHAEL PERRY, PH.D., PRESIDENT AND CEO OF PHARSIGHT CORP., AND ARTHUR REIDEL, CHAIRMAN OF THE BOARD OF DIRECTORS FOR PHARSIGHT, OUTLINE THE POTENTIAL SOLUTION AND DESCRIBE THE REMAINING OBSTACLES TO SUCCESSFUL IMPLEMENTATION OF TECHNOLOGY AS A WAY TO UNCLOG THE PIPELINE.

> THE ROOT OF THE PROBLEM IS IN THE WAY THE INDUSTRY HAS TURNED OUT THE HIGH-YIELD BLOCKBUSTER DRUGS CURRENTLY FACING PATENT EXPIRATION.

One of the more profitable industries in American business history, the pharmaceutical industry faces a crisis threatening its very livelihood. With 21 of its best-selling drugs coming off patent in the next five years, accounting for $40 billion in annual U.S. sales, the industry has a major gap in its pipeline of potential replacement block-busters. Some industry observers, such as the Wall Street Journal in a recent series of editorials, have pointed the finger at the Food and Drug Administration as a major contributor to this problem. According to Dr. Perry and Mr. Reidel, the root of the problem lies not in the standards or process applied by the FDA, but rather in the time-honored recipe by which the industry has turned out the high-yield blockbuster drugs currently facing patent expiration.

"The good news is that technology with demonstrated ability to significantly shorten development time and increase overall success rates is now available," Dr. Perry says.

What Are the DIMENSIONS of the Problem?

While the explosion of genomics and related technologies has increased the number of targets accessible for drug discovery, the slow and expensive drug-development process has persevered virtually unchanged for 40 years, say Pharsight executives. According to a study from the Tufts Center for the Study of Drug Development, the average cost of bringing a drug to market is now more than $800 million (more than half of this total is consumed in development), with the clinical-trial process alone taking an average of 68 months. Further, a study from the Georgetown University Center for Drug Development Science revealed that, even with the current rigorous FDA standards, more than 20% of all new drugs are approved with dosages that are later found to be too high. Perhaps the most troubling statistic is that in recent years the major pharmaceutical companies on average have brought only 0.6 new drugs a piece to market.

Where is the REAL SOLUTION to be Found?

While adoption is in its early stages, Mr. Reidel says, more than 150 development programs at numerous companies already have applied computer-based modeling and simulation, as well as other innovative information technologies, to improve development efficiency significantly. Results have included sharp reductions in late-stage attrition, with the attendant increase in overall success rates, reductions in development program expense, and simultaneous compression of development timelines along with improvement in product revenue after market introduction.

"In one recent example, a model-based adaptive Phase II trial design, planned with the assistance of computer simulations, resulted in a six-month reduction in time-to-market and an expected increase of hundreds of millions of dollars in program revenue," Mr. Reidel says. "Other companies have found that consistent integration of development information, using the latest database and analysis information technologies, has resulted in dramatically improved portfolio decision-making. While distinguishing the top and bottom several candidates has always been relatively straightforward, the improvement of clarity concerning the 'middle mass' of candidates is a welcome solution to a perennial and thorny problem."

According to Pharsight, decisions regarding a product's viability now can be made more strictly based on its scientific and clinical merits rather than, as all too often previously has been the case, based largely on the presentation and political skills of its champion.

When Can LARGE-SCALE IMPLEMENTATION be Achieved?

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ARTHUR REIDEL AND MICHAEL PERRY, PH.D.

A resolutioned and robust pipeline will only be possible when strong leadership within pharmaceutical companies drives change at the organizational level to ensure that the appropriate foundation exists for the new information technologies to have a real impact.

How Can We Expect the FDA TO REACT to these New Technologies?

With regard to cutting-edge development information technologies, the Food and Drug Administration appears to be keeping full pace with the pharmaceutical industry and, in certain circumstances, may lead the industry. According to Dr. Perry, the FDA took important steps toward technology adoption by accepting electronic submissions for new drug and biologic applications.

"More recently, the FDA's 21 CFR Part 11 regulation established the standards required for compliance with regard to the database and analysis technologies," he says. "The FDA has worked through its CRADA (Cooperative Research and Development Agreement) program to evaluate and help develop clinical-drug trial simulation and population pharmacokinetic (PK) analysis software. Through such initiatives, the FDA is helping advise companies on how to leverage IT throughout the development process."

According to Mr. Reidel, the pharmaceutical industry can reasonably expect support from the FDA, but broad adoption of technology innovations and processes under which these innovations can have the greatest impact will result from a dynamic shift driven by industry leaders.

"As pressures increase on various fronts, the pharmaceutical industry's life and death decisions — literally and economically — will not disappear anytime soon," Mr. Reidel says.

Pharsight's Mr. Reidel and Mr. Perry agree that, ultimately, investors will benefit from increased and sustained revenues, patients will receive important new therapies delivered more quickly and at reasonable expense, and the FDA will receive more comprehensive and convincing trial data.

"This vital transformation, of an industry whose development processes have resisted change for more than four decades, truly will be a 'win-win' for the pharmaceutical companies and all of their stakeholders," Mr. Reidel says.◆

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"The pharmaceutical industry must invoke a major paradigm shift — much like that experienced by the automotive and aerospace industries decades ago — through which information technology is used to make smarter decisions, resulting in more of the right products identified sooner, and not an increase in the development of the wrong products," Dr. Perry says. "This new foundation, through which information technology can significantly increase profitability, will require disassembly of the silo approach of classic pharma and the creation of a new collaborative framework."

According to the Pharsight executives, the new framework will enable more efficient decision-making by promoting seamless sharing of knowledge derived from the process of clinical-trial execution."

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