

BioConvergence:

How New Biotech and IT Will Redefine the Health Care Industry

HUMAN HEALTH is playing a role in the modern economy like never before. Political debates over prescription drug benefits for individuals and the shift toward defined-benefit pension plans for companies reflect the successful development of life-extending technologies and knowledge. With each new year, the average human lifespan grows longer, and this demographic shift will dramatically affect the long-term growth rates of the economy and the industries that serve human health.

Health care is increasingly driven by the continued integration of bio-based and information-based technologies into the health care industry. Together, these vastly different industries will result in a new era of bio-based products and services that are designed, manufactured, and delivered to extend human lifespans. By our account, these technologies now form a new global industry, one we describe as the "bioconvergence industry."

Bioconvergence merges previously distinct technologies into a new form, including new theories, new practices, and new products. Indeed, we see massive convergence of information technologies, telecommunications, biotechnology, robotics, optics, sensors, materials science, physics, chemistry, and nanotechnology — all designed to positively affect the health of humans, plants, animals, and the environment. Even some consumer products such as plastics are evolving into bio-based systems.

Stop to consider the many areas and industries that bioconvergence promises to touch:

- **Homeland security:** The U.S. government is demanding new biological detection agents and biometrics to detect and protect against chemical and terrorist attacks.

- **Energy:** Biofuels will help reduce our dependence on oil and improve the quality of our environment, while bringing new jobs to our agricultural states. President Bush has emphasized the need for new clean energies based in agriculture so that our long-term energy security is improved.

- **Biodevices:** Including drug makers and medical device manufacturers, the biomedical market is the largest submarket under the biotech umbrella. According to the Batelle study *State Bioscience Initiatives 2004*, there are 14,000 biomedical firms in the United States that employ 730,000 individuals.

- **Biosourcing:** Biopharmaceutical manufacturing organizations provide outsourced manufacturing services to drug makers to scale up the production of drugs or biopharmaceuticals. Many drug discovery bioscience companies are small and do not have the financial means to support capital-intensive manufacturing equipment. For these companies, the ability to outsource production is critical.

- **Agribusiness:** Agribusiness now uses biotechnology to modify agricultural feedstocks to be more productive. This could be an enhancement of crop productivity, resistance to disease, or a genetic modification for added human health benefits. Nutraceuticals is the use of food or agricultural inputs to provide health and medical benefits, including the

prevention and treatment of disease. Batelle estimates that the agricultural and industrial bioscience markets comprise nearly 20 percent of total biotechnology employment.

- **Clinical testing:** New clinical testing organizations provide outsourced support to other biopharmaceutical companies, typically drug developers. The clinical testing organization can handle all or just certain stages in the clinical trial process that is mandated by the Food and Drug Administration (FDA) for drug approval. This requires identifying and screening test subjects, performing testing in accordance with FDA procedures, and certification of results.

The life sciences industries have experienced strong growth over the past five years. The general aging of the U.S. population coupled with higher disposable incomes is increasing the demand for life-enhancing products. Based on U.S. Bureau of Labor Statistics figures, employment in the cluster has expanded by nearly 100,000 jobs from 2000–2005. Average wages in the biosciences cluster have increased at an even more explosive rate — the average annual wage grew by 12.6 percent since 2000 to \$71,000 in 2005. Growth in this cluster is projected

convergence industry are growing, and many offer wage levels at least twice that of the U.S. average (see charts).

SITE SELECTION *for* BIOCONVERGENCE COMPANIES

With so many regions vying for the attention of new bio-based companies, executives must engage in a formal site selection process that will deliver the maximum strategic and economic value to the company. AngelouEconomics employs a site selection process comprised of seven main steps:

1. Project setup/needs assessment
2. Determine incentives strategy
3. Issue a request for proposals
4. Evaluation of top locations and sites
5. Cost of operation benchmarking
6. Short-list communities and engage in closing negotiations
7. Final selection

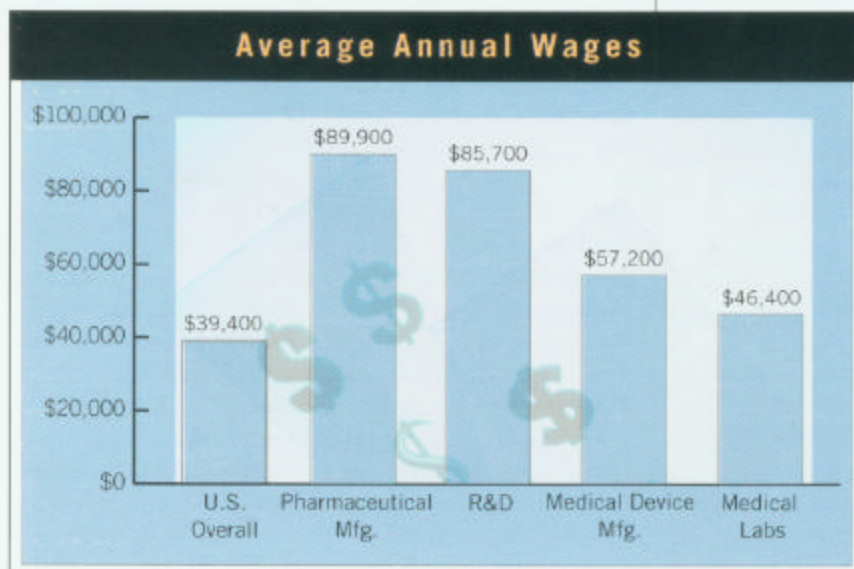
- **Step 1 — Project setup/needs assessment:**

It is important to determine project goals, facility needs, and site selection criteria in the initial phases of any site selection project. Initiate a one- to two-day brainstorming session regarding the scope of the project, desired outcomes, and timeframe. These meetings should include top management, facility directors, financial executives, accounting consultants, and site selection consultants. Often, executives have early expectations on where their next facility or office is best suited. A discussion of incentives begins here, with the site selection consultants giving an early assessment of what incentives could be available based on similar type expansions and relocations. Milestones and success metrics should be set.

The most effective site selection efforts allow four to eight months for the full evaluation, negotiation, and selection of a community.

- **Step 2 — Determine an incentives strategy:**

Most technology companies are moving at a pace too



Source: BLS, through Q2 of 2005

to continue at a strong but slower rate. National employment projections indicate growth of 16.7 percent by 2014, compared to the overall national growth of 14.1 percent. Today, all sectors in the bio-

fast to allow the exploration of incentives in their site selection decisions. For many, incentives are often the icing on the cake, sweetening the deal after a decision has already been made. Software companies are generally too small to see the benefit of financial incentives or just don't qualify. But others, such as manufacturers, know just how valuable incentives can be. New industries such as nanotechnology, biotechnology, and fuel cells are now caught up in a virtual "incentives arms race" among states and communities. Hiring a site selection consultant is a requirement to effectively explore the full range of incentives opportunities. In addition, a consultant provides "arm's

Life Sciences

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length" protection from any problems or aggressive negotiations that might sour the public relations impact of an announced move. While the primary effect of incentives is to remedy a prejudiced or



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burdensome tax system, incentives often become a stamp of approval by communities that companies seek in their local public relations. More than ever, incentives are cash-based, where state and local governments commit funds to invest in infrastructure, work force training, free land, and buildings. Many states are now choosing to deliver hard cash to a company in order to win these strategic projects and make a marketing statement to the world.

- **Step 3 — Issue a request for proposals:** If a bioconvergence company wishes to pursue incentives, it is important that its site selection representative issue a request for proposals to a large list of communities. This ensures that a full range of options are presented to the decision makers, and incentives negotiations can begin. Companies should present themselves to communities in a confidential fashion, using project code names and relying on non-staff to interact with local business and government representatives.

- **Step 4 — Evaluation of top locations and sites:** The technology company or its site selection consultant must do thorough research on its list of potential locations. Today, communities maintain much of their information on an economic development website. In fact, site selectors use the Internet to gain most of the information they need in their evaluation before any phone calls or visits occur. Communities should be evaluated for each of the criteria set out in Step 1. Good site selectors will devise a weighted ranking system for all factors and rate communities on each.

For companies that require very specific sites for new construction, such as medical device manufacturers, visits to a community must be conducted by an experienced engineering or site selection team. These individuals make physical evaluations of sites and typically get information from local authorities on their acreage, topography, soil type, zoning, geotechnical conditions, utilities, and access points. The lack of sites and infrastructure may remove a community from a site selector's evaluation list. Technology manufacturers are increasingly focused on the supply of developed, "shovel-ready" sites in communities throughout the United States, thus raising the bar for corporate recruitment. Many communities precertify their manufacturing sites for specific uses such as semiconductor manufacturing or automotive manufacturing.

Utility evaluations are still very important to bioconvergence firms, particularly those with sensitive manufacturing processes or a large datacenter requirement. The demands of the digital world result in the large consumption of power. Affordable, reliable electricity is of utmost importance, particularly for manufacturers or datacenters. Dual-feed and gasoline-powered backup generators are extreme examples of requirements. Reliable telecommunications are equally important. Site selectors will evaluate brownouts, outages due to storms, power spikes, and excess capacity for peak periods. In light of the massive blackouts in the Northeast in recent years, reliability of the electric grid deserves greater scrutiny.

- **Step 5 — Cost of operation benchmarking:** Bioconvergence firms vary in their attention to costs. Manufacturers and large consumers of electricity do thorough evaluations of the costs for various locations. This benchmarking analysis should cover the cost of labor, supplier purchases, air travel among locations, real estate costs, and tax costs. This analysis is generally done by the site selection consultant or an in-house financial analyst. Benchmarking the final communities for a variety of weighted scores can help determine where an operation would experience the lowest operating costs. Numerous factors are ranked and weighted for all areas in contention to determine which areas are best suited for the operation.

- **Step 6 — Short-list communities and visit:** Once the initial analysis is completed, it is necessary to visit the candidate communities on the short list. These visits are meant to confirm the data sent by the community, visit prospective sites or buildings, and meet with local government, academic, and business leaders. The community visit is the most important part of the site selection process, and should be the determining factor in selecting a finalist city. Typically, a company will select a primary location but will have one or two other acceptable alternatives. This will allow more effective negotiations at the end of the process and provide a working alternative in the event a "fatal flaw" is discovered during detailed analysis and negotiations. Visits should generally be planned for one to two days per city in order to thoroughly review all the requirements in the selection process.

- **Step 7 — Final selection:** If incentives are

part of the selection process, intense negotiations are required in the final weeks of the decision. Corporate executives must be involved in these negotiations, and an internal understanding of incentives targets is key. Confidentiality is best kept throughout negotiations with communities.

The final selection of a community often rests on one or two key requirements, including the availability of a site, the desire of the CEO, a marketing goal, or an incentive. The winning city is almost certain to be the one that brought the most comfort and enthusiasm to the CEO and the executive team. Thorough evaluations by staff and consultants can provide strong guidance to decision makers, but not a final decision. Once a decision is made, a company should make every effort to maximize the publicity and exposure in the community in order to build goodwill and begin to attract the critical technical talent that they will need.

The FUTURE of BIOCONVERGENCE

The integration of biotechnology and information technologies into the health care industry will continue at a steady pace for many years. The locational shift that will be associated with this industry will likely continue until new bioconvergence regions clearly emerge as winners. The role of global players in this industry should be monitored for its effect, particularly in areas that have fewer restrictions — stem-cell research in Asia, for example — or a growing specialized work force, such as technicians and doctors in India. More and more bioconvergence companies will go “virtual,” keeping all manufacturing abroad as well as a large share of their research capabilities. The future of the bioconvergence industry is still unclear, but its wide-ranging effect and future economic impact deserves our personal and business attention. Hopefully, we will be watching its progress for many years to come. ■■■

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