# The view from the top

## San Diego is facing significant challenges to its future development. How do the some of the region's leading lights think it will cope? Ken Howard finds out.

MARTHA DENNIS; BALDERAS

How does the health of the general economy determine the fortunes of the high-tech and biotech sector? What country is the biggest challenge to the United States' dominance in these fields? Where does San Diego fit into the global high-tech enterprise? *Nature* asks some of San Diego's leading people in business and academia:

Martha Dennis, *president, San Diego Telecom Council, and partner, Windward Ventures*
David Gollaher, *chief executive, California Healthcare Institute, La Jolla*
David Hale, *chief executive, CancerVax, Carlsbad*
Michael Jackson, *senior vice-president, the RW Johnson Pharmaceutical Research Institute, La Jolla*
Tina Nova, *chief executive, Genoptix*
Larry Smarr, *director, California Institute for Telecommunications and Information Technology, and professor, computer science and engineering, Jacobs School of Engineering, University of California, San Diego*
Marco Thompson, *chief technology officer, Wind River Services, San Diego and chairman, San Diego Telecom Council*

**How connected are the fortunes of high-tech/biotech to those of the general economy?**

*Martha Dennis:* In general, the near-term fortunes of high-tech very closely reflect the economy. A good part of the high-tech market is determined by consumers' disposable income, and the availability of capital for new development is tied to the state of the stock market. One exception is the defence sector, which, of course, also feeds a good portion of the high-tech market, and is somewhat less vulnerable to the ups and downs of the economy.

*David Gollaher:* The general economy and the capital markets are the basic platform for starting new ventures, so if there's really a bear market or a market like the one we saw in 1993, there is much less risk capital available for new ventures. In a broader sense though, biotech, medical technology and medicine have the wind at their back. We have an ageing population and an increasing ability to mitigate the effects of age through medical technology, so there is an enormous demand for these products. The macroeconomy will certainly affect company formation, but the market, the ultimate demand for these products, is growing.

**What is the weakest link in technology transfer out of academia?**

*Michael Jackson*: Typically, when the first gem of an idea doesn't turn out to really go anywhere. After two years the company is no longer working on the kernel of what the founders were working on. The original idea didn't pan out, but they still have money. And they're lost.

*Tina Nova:* Universities should encourage development of new discoveries on campus to narrow the gap between academic science and marketable product before offering a technology or compound for licensing. Good models for this are PharmaSTART (a consortium of research organizations that offers drug-development services to California-based universities, research institutes and small biotech companies) and the von Liebig Center for Entrepreneurism and Technology Advancement (which promotes the commercialization of the work of the Jacobs School of Engineering) at the University of California, San Diego (UCSD).

*Larry Smarr:* Universities often have modelled their technology-transfer programmes on owning intellectual property. They should focus instead on how best to move their ideas to market. In this model, the university's financial rewards come from the generosity of successful alumni entrepreneurs instead of revenue streams from intellectual properties. Stanford is the closest university to this ideal.

*Martha Dennis:* There's lack of recognition that an idea must move from discovery-focused ownership to market-focused ownership. The folk who show genius in one realm are often disasters in the other. There must be a handover from those who invent to those who build the business. The sooner universities recognize this, the faster they'll make money from their intellectual property.

**How should the federal government be supporting high-tech/biotech?**

*Martha Dennis:* Government must take on the role of filling the innovation gap that has recently been created by the shutdown or decreased funding of industry-funded research institutions such as Xerox's PARC. In the past these institutions were an essential part of maintaining the research edge that kept the United States ahead of other countries.

*Tina Nova:* The Small Business Administration should give Small Business Innovation Research grants to venture-backed companies. Currently, many of these grants are in jeopardy, and they can be a lifeline to struggling biotechs.

*Marco Thompson:* Government should get out of the way. The technology and communications businesses should be deregulated as fast as possible. Government should be supporting basic research with big investments. It should not be helping the telephone service providers now in the

Left to right: Martha Dennis; David Gollaher; David Hale; Michael Jackson; Tina Nova; Larry Smarr; Marco Thompson

market. The consumers should be picking the winners.

**Where does San Diego — and the United States — stand in relation to global high-tech/biotech?**

*David Gollaher:* The United States is the global leader by far in biotech, and part of the reason is that it is the only free, non-price-controlled market in the world. Look everywhere, from the United Kingdom to Australia to Germany: all have strong price controls on drugs and medical technology so there's much less incentive in these local markets for company formation. The Europeans are waking up to see how much medical innovation they've lost, and they are very concerned.

On the world stage, you'd have to say that the Bay Area — everything from Silicon Valley up though Berkeley and down to South San Francisco — represents by far the largest cluster. The second would be the Route 128 corridor in Boston and Cambridge in Massachusetts, and the third would be San Diego. What San Diego doesn't have yet is a cluster of large, commercially successful companies that have emerging products on the market. IDEC Pharmaceuticals (developer of therapeutic monoclonal antibodies such as Rituxan) is among the first, but its products are really distributed, and to a large degree manufactured, by Genentech — and, of course, it has now combined with Biogen. So we're still looking for companies that are past the R&D stage to develop commercial manufacturing operations here in San Diego to make it a real powerhouse.

*Marco Thompson:* Our global leadership is threatened by the quality of our education, and the numbers of engineers graduating elsewhere. Our university infrastructure is the best in the world, and the best foreign students still elect to attend US universities. But our high-school graduates are not even in the top ten in international surveys. Last year, US universities produced 50,000–60,000 engineering graduates. China graduated ten times that. The engineers graduating today are the entrepreneurs of tomorrow.

The main threats to our domination of high-tech come from China and India — I think principally from China. Having a great global competitor in China would be no bad thing for the United States. It will force us to take a long hard look at how we do things, and how we compete.

*Martha Dennis:* In certain segments of telecommunications in particular, the United States has enjoyed global technical dominance, and the telecommunications innovation companies of San Diego have been a very healthy part of this. Recently, an increased amount of design work is being done abroad. At this point, it is lower-level design work and the intellectual property that San Diego companies are developing is still critical, but there is a concern that this could change.

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**How does San Diego fare for money, status and talent in comparison with other high-tech hubs? Why should I start a high-tech company here?**

*Marco Thompson:* The Bay Area is still far ahead of San Diego in all three. The venture guys are all parked on Sand Hill Road in Palo Alto and most of our entrepreneurs have to get on a one-hour flight every time they raise money. In the Bay Area, they have been at this technology business since Hewlett and Packard set up shop in that famous garage. They have a 20-year start on the rest of the world.

San Diego will establish its status and credentials by building the fastest-growing and healthiest tech community in the world. The secret weapon is the Jacobs School of Engineering at UCSD.

*Larry Smarr:* San Diego is in a similar position to Silicon Valley in the late 1970s and early 1980s. There is a huge fuel tank to drive this growth in that the San Diego, Irvine and Riverside campuses of the University of California will absorb a large amount of the university's growth over the next decade. For instance, UCSD alone will hire over 400 new faculty. Companies in San Diego are also very collaborative and organized. A good example is the San Diego Telecom Council, which has weekly talks for its nearly 300 member companies.

*David Hale:* San Diego lab and office space are cheaper than in many East Coast locations, and an influx of pharmaceutical companies such as Pfizer, Merck, Novartis and Johnson & Johnson has deepened the talent pool that all biotech companies draw from.

*Martha Dennis:* You'll be entering a uniquely open but close-knit technical business community known internationally for mutual support rather than back-biting. And you'll find several world-renowned educational and research institutions. You'll be able to hire staff from a rich pool of technical talent unique to San Diego. And, of course, there's always the climate. ■

**Ken Howard is a contributing editor for *Nature*.**