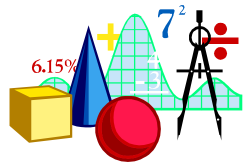
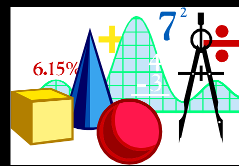
UNIVERSITY RELATED INCUBATORS



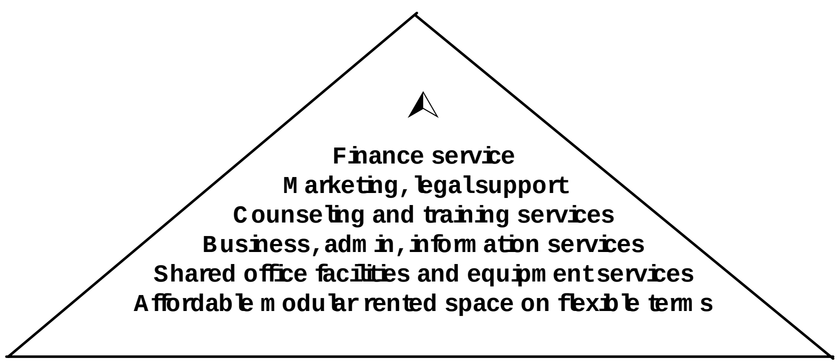
Alameda Center for Environmental Technologies
August, 1997

UNIVERSITY  RELATED INCUBATORS

➢ Introduction - Incubators In Short

According to the Small Business Administration, four out of five new businesses fail within the first five years. However, the National Business Incubator Association estimates that 80 percent of firms cultivated in an incubator continue to operate after the same time period has elapsed.[1] Incubators provide a number of facilities and services including reduced rent, shared equipment and assistance with legal, financial, planning and marketing issues. In return, successful companies pay taxes, hire new employees and contribute to the local economy. The pyramid in Figure 1 below presents the general services offered by most incubators with the highest cost, less frequently used at the upper layers.[2]

Figure 1:
Incubator Services Pyramid



In the United States, most incubators fall under five categories: 1) mixed use, 2) technology, 3) light manufacturing, 4) service, and 5) micro-enterprise/empowerment. The majority of

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[1] Goldfisher, Alistair. “Incubators Hatch Business Chicks.” *The Business Journal.* August 5-11, 1996.
[2] Lalkaka, Rustam. “Technology Business Incubators: Critical Determinants of Success.” *Annals of The New York Academy of Sciences.* Vol. 278, 1996.

incubator clients tend to be involved in either light manufacturing, service, technology, or research. Table 1 below presents a breakdown of the types of incubators and clients in the US.

TABLE 1:
INCUBATORS AND INCUBATOR CLIENTELE BY TYPE

Incubator Type	**Percentage**
Mixed Use	42%
Technology	30%
Light Manufacturing	13%
Service	9%
Micro-enterprise/Empowerment	7%
Incubator Clientele by Industry Type	**Percentage**
Service	40%
Light Manufacturing	23%
Technology	22%
Research	7%
Other	8%

Source: NBIA, 1997.

Business incubators are relatively new and still evolving. They have been used for a variety of purposes including, job creation, wealth creation, industrial regeneration, technology transfer, and more recently, military base redevelopment and reuse. In the United States, incubators established to increase the growth rate of new and small businesses are seen as a tool for local growth and development. There are over 500 incubators recognized by the National Business Incubator Association in the United States, 90 percent of which have opened since 1983.

Several studies evaluating the impact of business incubators have found that higher success rates for incubated firms than they did for most new businesses. In addition, most firms stayed in the community after graduation, which means that the benefits of a successful incubator remain local. However, job creation per incubator firm tends to be relatively small, fewer than ten employees, increasing over the long-term. Thus, incubators cannot be seen as a short-term, quick fix to local economic problems.[3]

➢ University Sponsored Technology Incubators in the US

The most prominent, and successful, incubators have been those associated with substantial local economic growth and/or the development of new technology industries. For example, the Austin Technology Incubator, associated with the University of Texas, Austin, has nurtured more than 38 companies, created more than 500 jobs, and brought approximately $60 million to the local community in the first four years of operation.[4] In San Jose, Software Business Cluster (an

[3] Markley, Deborah, M. and Kevin T. McNamara. "Economic and Fiscal Impacts of a Business Incubator." *Economic Development Quarterly.* Vol. 9, No. 3, August, 1995.
[4] Enterprise Panel. *Growing Success: Helping Companies to Generate Wealth and Create Jobs Through Business Incubation.* Midland Bank plc, October, 1996.

incubator associated with San Jose State) firms have received over $20 million in venture capital, while companies at the NASA Ames Technology Commercialization Center incubator have generated about $550 million.[5]

Evidence exists suggesting that universities have a seedbed effect on their local economies.[6] Indeed, a relationship has been established between firm innovation rates (measured by patents) and the level of local university research. This suggests the existence of technological spillover that benefits firms located within the general vicinity of a university.[7] Capitalizing on this spillover effect, the university incubator (like the Austin or San Jose incubators) is employed by some entrepreneurial universities to provide support for nurturing new technology firms.

In addition, other incubators, such as the Environmental Business Cluster, the Software Business Cluster, and the International Business Incubator in San Jose, are designed, in part, to provide more opportunities for students and professors at San Jose State University, enabling them to make downtown San Jose more of a technology center.[8] According to Mitchell (1996), San Jose State President Robert Caret is promoting formal internship programs with the downtown incubators, and is looking at the possibility of commercializing research conducted on campus. San Jose State will also be encouraging professors to look into consulting opportunities with the incubator start-ups.

The incubation concept seeks to link talent, technology, capital and know-how to leverage entrepreneurial talent, accelerate the development of new companies, and thus speed the commercialization of new technologies.[9] Most universities are generally motivated to implement incubator program because of a desire to stimulate regional economics and/or to encourage the commercialization of the university's own research.[10] Links between the university and the incubator usually include labs and workshops, student employees, faculty consultants, library resources and technology transfer. Table 2 below presents the contributions of university-related services, and assesses their value to incubator clients.[11]

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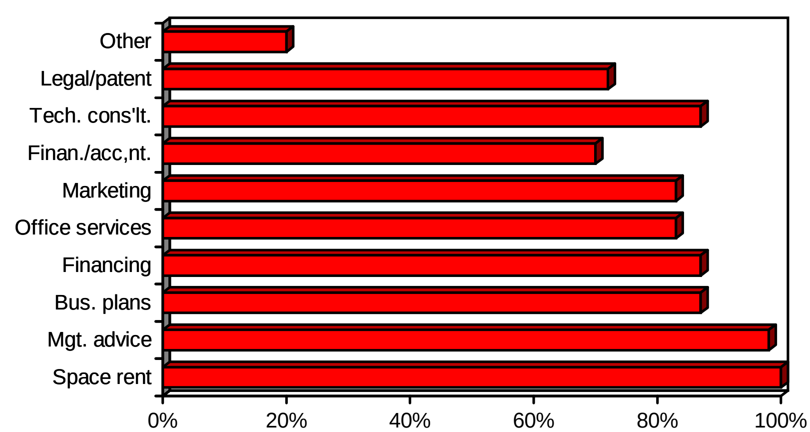
[5] Goldfisher, 1996.
[6] Felsenstein, Daniel. *University-Related Science Parks - Seedbeds or Enclaves of Innovation.* Technovation, Vol. 14, No. 2, 1994.
[7] Jaffe, A. "Technological Opportunities and Spillovers of R&D. *American Economic Review.* Vol. 76, 1986.
[8] Mitchell, James J. "San Jose Woos Firms." *San Jose Mercury News.* Tuesday, July 9, 1996.
[9] Smilor, R., and Magill. *The New Business Incubator: Linking Talent, Technology and Know-How.* Lexington Books, Lexington, MA, 1986.
[10] Matkin, G. *Technology Transfer and The University*. Macmillan, NY, 1990.
[11] Mian, Sarfraz A. "Assessing Value-Added Contributions of University Technology Business Incubators to Tenant Firms." *Research Policy.* Vol. 25, 1996.

TABLE 2: CONTRIBUTIONS OF UNIVERSITY RELATED SERVICES				
Service	**No Value**	**Minor Value**	**Moderate Value**	**Major Value**
University image	19%	12%	28%	40%
Labs/wrkshps/equip	33%	16%	18%	33%
Student employees	13%	20%	35%	32%
Faculty consultants	20%	28%	26%	26%
Library resources	19%	26%	29%	26%
Related R&D	49%	9%	20%	22%
Education & training	69%	9%	13%	9%
Tech transfer programs	59%	23%	12%	6%
Sports & social activities	56%	29%	9%	6%
Mainframe computer	73%	15%	9%	3%
Source: Mian, S.A., 1996.				

As of 1996 there were 550 incubators in the United Sates with a new facility opening every week. About 20 percent, or approximately 100, are technology incubators, and most of these are sponsored by universities. Roughly half of all technology incubators are located in urban areas and focus on general technology, while 20 percent focus on software and another 20 percent are involved in the medical or biotech industries. The average square footage is 31,000 and most university sponsored technology incubators offer a range of services including management advice, business plan preparation, financing and marketing. Chart 1 below presents the general services offered at technology incubators in the US.

Chart 1:
Types of Services Offered
Source: National Business Incubator Association, 1997



On average, there are 14 tenants and about 250 employees, with an average wage of $35,000 per technology incubator in the United States. For tenants that entered incubators in 1993, total investment capital has risen from $130,000 to $552,000 in 1996. Gross sales have increased per business from $169,000 in 1993 to $1.14 million in 1996. The average technology incubator operates on $320,000 per year with over half of its revenue generated from rent. As presented in Table 3 below, other sources of income include service fees, subsidies and grants.

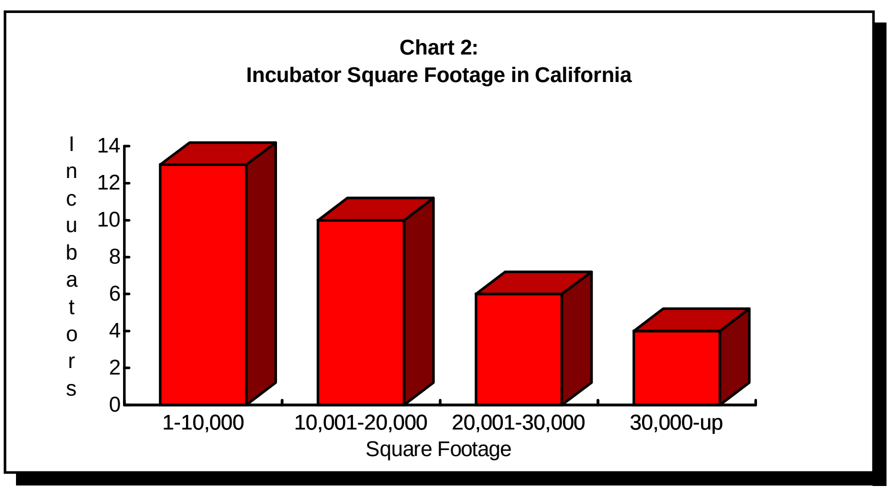
TABLE 3:
TECHNOLOGY INCUBATOR INCOME SOURCES

Source	No of Incubators	Avg. % of Revenue
Rents	40	55%
Service Fees	22	11%
Subsidies	22	54%
Project Grants	19	41%
Miscellaneous	8	10%
Training Fees	6	10%
Royalty/Equity	4	29%

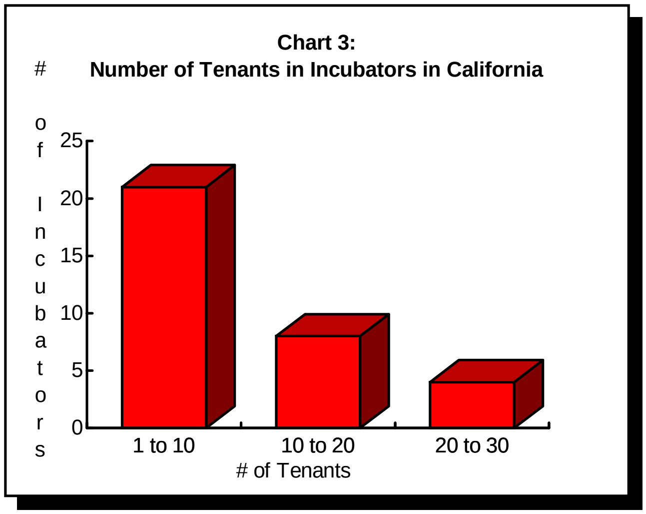
Source: National Business Incubator Association, 1997

➢ Incubators in California

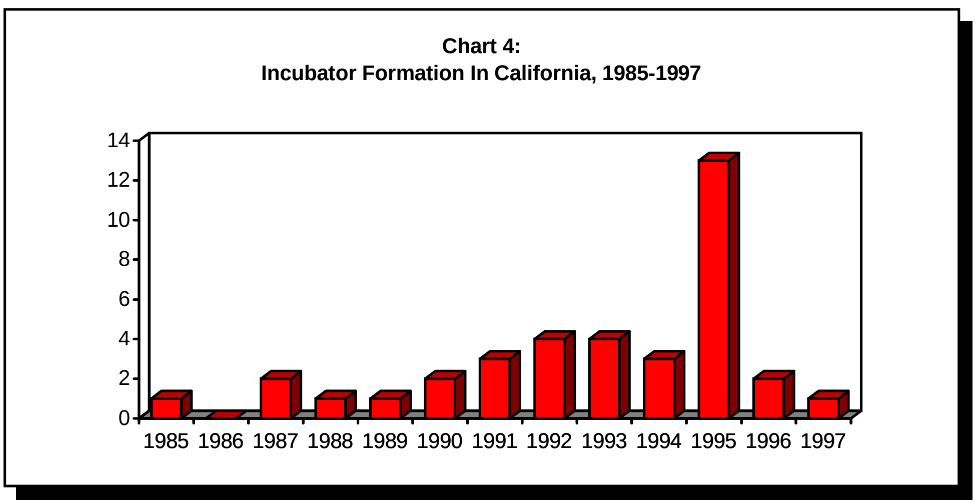
Of the 550 incubators in the United States, approximately 49 are in California accounting for about nine percent of the total. Of those 49, roughly 39 have provided data concerning total square footage, year of opening, and number of clients.[12] The average square footage for California incubators is about 20,000 square feet while the average number of tenants is ten. A breakdown of square footage and number of tenants is presented in Charts 2 and 3 below.



[12] California incubator charts and statistics created by author. Raw data obtained from Harley Consulting Group, 1997.



The median year for grand opening is 1994, although 1995 saw the greatest number of incubator openings with 13. Chart 4 below presents a review of incubator formation in California from 1985 to 1997.



In the Bay Area there are 17 incubators, five of which are located in the East Bay, with a sixth (Alameda Center for Environmental Technologies - ACET) planned to open this fall. In comparison, there are five incubators located in San Jose alone. Bay Area incubators, accounting for approximately 35 percent of all California incubators, are listed in Table 4 below.

According to EPS, the Bay Area is able to support such developments because of a complex and robust web of relationships between its universities, a flexible and innovative technology business sector, a large and sophisticated venture capital community, and a highly skilled and job-mobile workforce.[13] Bay Area universities can work with local governments, developers and economic development agencies to create the pre-conditions for self-sustaining research districts that simultaneously achieve the university's goals and help rehabilitate abandoned, underused and unused urban space. Universities can then focus more of their resources on attracting top researchers, facilitating research and technology transfer, and establishing the links to commercial enterprises that are fueling technology-based economic expansion.[14]

TABLE 4:
INCUBATORS IN THE BAY AREA

Incubators	City
East Bay	
▪ Alameda Center for Excellence	Alameda
▪ CALSTART Project Hatchery	Alameda
▪ Alameda Center for Environmental Technologies✦	Alameda
▪ Contra Costa Software Business Center	Martinez
▪ Communications Technology Cluster	Oakland
▪ Oakland Small Business Growth Center	Oakland
North Bay	
▪ Marin City Enterprise Center	Marin City
▪ Digital Village	Novato
▪ DigiQuest Learning Center	San Raphael
San Francisco	
▪ San Francisco Renaissance	San Francisco
▪ The Tides Center	San Francisco
South Bay	
▪ Daly City Small Business Center	Daly City
▪ Center for Entrepreneurial Development	San Jose
▪ Environmental Business Cluster	San Jose
▪ International Business Incubator	San Jose
▪ Silicon Valley Micro Enterprise Center	San Jose
▪ Software Business Cluster	San Jose
▪ NASA Ames Technology Commercialization Center	Santa Clara

✦ Planned to open in Fall, 1997.
Source: Alameda Center for Environmental Technologies; Harley Consulting - 1997.

➢ Environmental Technology Incubators in California

While ACET is soon to enter its first year, other environmental technology incubators are up, running and forging alliances. With the Border Environmental Commerce Alliance (BECA) in Chula Vista taking the lead, a consortium of partners has been proposed to include both the Environmental Business Cluster (EBC) in San Jose and ACET in Alameda. In this way, all three centers can work together to provide the State with a comprehensive and innovative environmental technology program which would include: 1) a cluster development project; 2) an information warehouse and dissemination project; and 3) a partnership development and alignment project.

[13] Musbach, James R. et al. *Spontaneous Research Districts: Universities in Local Economic Development.* Economic & Planning Systems, prepared for Association of University Related Research Parks Annual Conference, Monterey, California, June 1997.
[14] Ibid.

The goal of the consortium is to accelerate the speed at which each cluster matures by eliminating redundancy, sharing ideas and experience, and leveraging existing resources for maximum economic benefit. Most importantly, however, all three incubators hope to capitalize on the globalization of the environmental technology market.

Currently, the largest export markets for the United States are in Canada and Western Europe. However, over the next few decades markets in the developing countries, especially in Asia and Latin America, will become as large as in the developed world.[15] As a leader in the industry, it is believed that the United States may be poised to capture a large percentage of the new world market. Indeed, the largest exporters of environmental technology are those countries with the most advanced environmental policies and frameworks.[16] However, due to a large domestic market and the limited financial strength and export experience of environmental technology businesses in the United States, the industry as a whole has made few in-roads into the foreign market. As a result, other countries such as Germany, Japan, England and France are building a strong competitive edge in the developed and developing world through efficient, government supported export strategies.[17] Chart 23 below presents the factors contributing to worldwide competitiveness, as identified by the OECD (1992), and how the United States compares to Germany and Japan.

As the US market slows and global opportunities grow, global marketing ability becomes more important. Smaller firms (which dominate the US environmental technology industry) especially need to determine the best way in which they can capture a share of the global market which is traditionally dominated by larger firms. Finally, the predominantly smaller size of firms in the industry means that venture capital or some other external financing is crucial to entering the market.

BECA has taken the lead on globalization of California environmental technology. Because of BECA's strategic location, seven miles from the US - Mexico border, BECA's emphasis has always been on trade and export. Larry O'Donnell, BECA's director, maintains exportability of product or service as his primary criterion for incoming incubator clients. Future developments at BECA include a Technology Showcase which will present products and services from all three incubators (San Jose, Alameda and Chula Vista) to the public, trade associations and missions, and local, state, federal and foreign governmental agencies.

In addition, BECA maintains an in-house venture capital firm which has already financed three clients located at the incubator. This firm is also sponsoring a new addition to BECA which will provide a space for manufacturing and light industry. By housing its own venture capital firm, BECA has implemented an innovative and effective program whereby small environmental businesses can attract the money they need to succeed in the foreign market.

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[15] National Science and Technology Council. *Technology For a Sustainable Future: A Framework for Action*. US Government Printing Office, 1994.
[16] OECD. *The OECD Environment Industry: Situation, Prospects and Government Policies.* Organization for Economic Co-operation and Development, Paris, 1992.
[17] National Science and Technology Council. *Bridge to A Sustainable Future: National Environmental Technology Strategy*. US Government Printing Office, April, 1995.

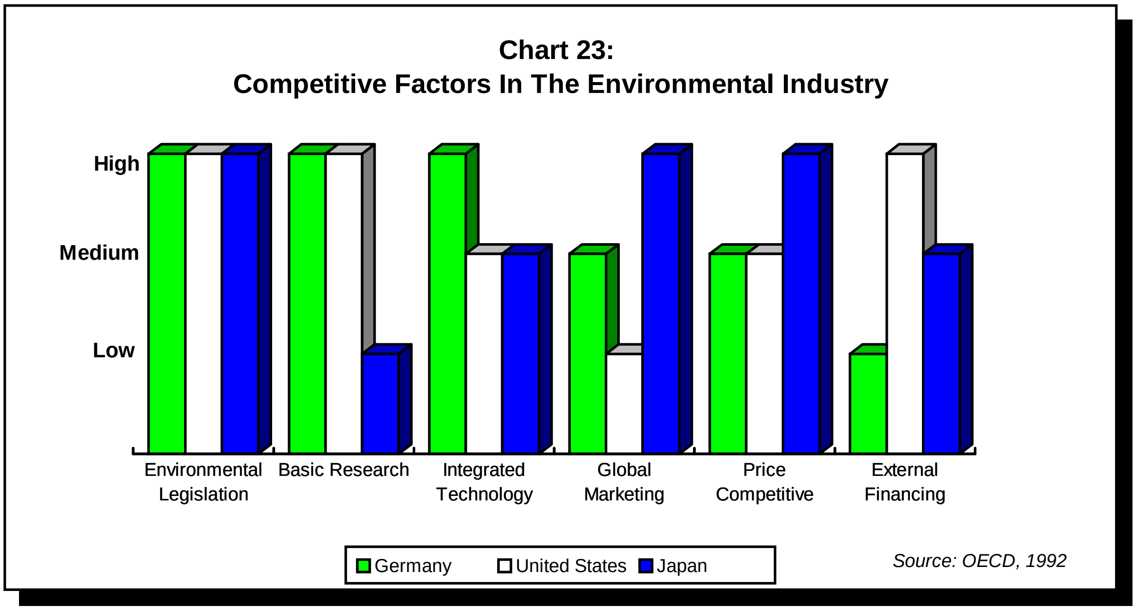
Chart 23:
Competitive Factors In The Environmental Industry
High
Medium
Low
Environmental Legislation
Basic Research
Integrated Technology
Global Marketing
Price Competitive
External Financing
Germany
United States
Japan
Source: OECD, 1992