

INSTITUTE FOR PUBLIC POLICY AND BUSINESS RESEARCH
THE UNIVERSITY OF KANSAS

INCUBATOR DEVELOPMENT IN EUROPE:
SOME IMPLICATIONS FOR KANSAS

by

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As part of a broader study of mechanisms of technology transfer and university-industry liaison, I was able to visit a number of incubators in both West Germany and the United Kingdom in Spring, 1990. Because of the variety of models, this report will first provide a basic description of the incubators visited and then draw some general implications stemming from the nature of incubator development in those countries. The objective of this report is not to derive definitive answers to specific questions, but rather to broaden horizons and stimulate new insights from this diversity of models and experience.

W E S T G E R M A N Y

Incubators are a common and successful phenomenon in West Germany. Two types seem to predominate, namely that which contains science and technology driven companies exclusively, and that which houses firms that are technology oriented, but not on an exclusive basis. I was able to visit one of each type.

Technology Factory - Karlsruhe

Karlsruhe is a mid-sized manufacturing city in the western part of the State of Baden-Wurtemberg. The immediate region of the city has one technology-oriented university, one polytechnic college, and three Fraunhofer Institutes (applied R&D Centers). The industrial composition of the region provides considerable potential for high-technology development.

The Technology Factory (innovation center/incubator) is located in an old manufacturing facility formerly owned by Singer that was acquired by the city when abandoned by the company in 1981. The city, the chamber of commerce, and the state jointly developed a plan for the building to be used to 1) incubate high-technology companies, and 2) house technology transfer organizations. The state bank provided loan finance to refurbish

the building. The actual operation of the incubator was handed to a wholly owned subsidiary of the Karlsruhe Chamber of Commerce.

It is one of the largest incubators in West Germany (about 22,000 square meters). At present it houses thirty new enterprises, which is full capacity, as well as being the location of five technology transfer offices of regional R&D institutions such as the university and the polytechnic. It includes a CAD/CAM laboratory, as well as the normal array of incubator facilities such as central services (FAX, telephone, etc.), conference rooms and library facilities.

Most of the companies are university or polytechnic spin-offs, or in some way related to the university, and although drawn from multiple disciplinary areas, the biggest is information technology, a primary strength of the university. Virtually all the entrepreneurs have a science and technology background. From its start in 1984 the incubator has grown to full capacity with thirty companies and eight-hundred employees. Eleven companies graduated from the incubator in the past year and have been replaced from a waiting list of firms.

The stated objectives are to provide entrepreneurs with a range of services that relieves them of the necessity to develop their own company infrastructure during the phase of prototype development and preparation for production and marketing, to help these companies achieve their development goals in a shorter period than would otherwise occur at the least cost possible, and to increase their subsequent opportunities in the market. The center staff therefore act as a conduit for information coming into the start-up companies, establish contacts for the companies, including federal, state and private funding sources, and provide counseling, training, patent assistance and the like.

Companies can stay in the incubator for a maximum period of five years. The incubator did receive federal government support, on a declining basis each year as the facility approached full utilization. There was also some support from the State government, but that was largely in regard to support services for the companies and in particular technology innovation counseling. The tenants pay for space and services at a rate that is below market. It is interesting to note that the Deutch Bank has set-up an incubator building as a private venture within a hundred yards of this facility, and that the rents there will be at market level.

This technology center/incubator is obviously a success. Indeed there have been no company failures to date. The incubator director identified the following factors as being conducive to this success:

1. Location. The facility is located in the vicinity of the university and within accessible distance of the polytechnic.

The incubator and the university/college make efforts to retain links with each other. There is a strong emphasis on students working part-time in the incubator companies.

2. High-Technology Orientation. - The incubator has been strict in only taking companies interested in medium or high-technology product development.
3. Support. The common facilities and services include a CAD/CAM laboratory, seminar rooms, and technology transfer offices of the higher education institutions in the vicinity.
4. Network. The incubator has extremely good contacts with the private sector, higher education, and state/local governments. This is enhanced by a largely private sector advisory board. These networking arrangements are a key basis for the success of the incubator and the companies in it.

The primary problem area has been the lack of venture capital. There has been considerable difficulty in getting venture capital firms to provide money to young companies at this phase of development. Consequently they were working on a new program to set-up a dedicated seed and venture capital fund for the incubator, which would be funded jointly on a 50/50 basis from the private sector and the federal government. This is part of a program by the German government to get more private monies into the risk capital area, and in particular to small and medium size companies, and hence the matching approach. It should be noted that these funds are available to these companies on a loan basis.

Technology Center, AACHEN

Aachen is a mid-size industrial center about 100km west of Dusseldorf in upper-central West Germany. The Technology Center is managed by Aachener Gesellschaft for Innovation and Technology Transfer, called AGIT, an economic development agency sponsored by local government of the Aachen region. It has other responsibilities including technology transfer to small/medium size firms, and linking such businesses in the north Rhine-Westphalia area or region to federal and state sponsored research matching grant programs. These joint research projects are undertaken directly with Aachen University, and could include companies in the incubator, though this is not common.

There was not a great deal of information available concerning the incubator. It is in essence an incubator of the general type that exists in the United States, it is for technology oriented as well as non-technology companies, and it provides the usual array of services associated with incubators. Perhaps the most interesting thing about it is that it is just one of five or six innovation centers in Aachen, with several more in the formation stage.

It is also noteworthy that this incubator is managed by an organization which also undertakes a major technology transfer function. AGIT is very much involved in acting as a conduit for linking companies with needed university research. It functions somewhat in the nature of the advanced technology centers, the broker type organization established in recent years as part of the Ben Franklin program in Pennsylvania and recently recommended to KTEC for implementation in Kansas, (IPPBR Report No. 161, 1989). There is a clear perception in West Germany that the university/colleges are insufficiently oriented towards undertaking technology transfer to smaller business, and that this can only be achieved successfully through intermediary mechanisms. AGIT is such a mechanism. It is extensively networked to the universities and the polytechnics, and to other technical transfer mechanisms.

Finally, it was interesting to note that the board of directors for AGIT is largely composed of representatives of the political units of Aachen and multiple cities in the surrounding region, although there is some representation from the chamber of commerce and state government. It was stated that the lack of private sector membership on the controlling board is a weakness that affects private sector linkages, particularly from small companies.

The following general observations can be made about incubators in West Germany:

1. Incubators are a recent but common phenomenon. It would seem that they exist in multiple forms and in multiple numbers throughout cities in West Germany.
2. They are very successful institutions.
3. While tenants in these incubators straddle the spectrum from no technology orientation to high tech, it would be fair to say that the primary focus is on companies with at least some technology orientation, and with specialist incubators being available for high technological startups.
4. The incubators provide a comprehensive array of services to tenants, both internally and through networking outside the incubator.
5. The incubators are extensively networked throughout the region and undertake a primary function of bringing the start-up companies into interface with outside contacts, funding sources, potential markets, etc.
6. As part of the networking, and in particular with respect to the high-tech incubators, technology transfer mechanisms are often located within the incubators. That is, university,

college, and applied research centers are often located within the incubators on an outreach basis.

Perhaps the most important thing to stress here is that incubators are just a small part of an overall technology development and transfer system in West Germany. They cannot be perceived in isolation from the existence of this very successful and highly networked broader system.

UNITED KINGDOM

There are a number of technology transfer and industry liaison programs in the United Kingdom sponsored by the United Kingdom government or the EEC. My impression is that while the individual programs have considerable merit, they do not constitute a coordinated system, nor are they integrated into a broader economic development strategy. On this account, there is a question as to whether they are as effective as they could be. This is in a context where private sector spending in R&D is low in comparison to competitor countries, where the record of innovation is also weak, and where it is recognized that small to medium size firms face significant size related difficulties with respect to access to technological resources.

One of the main elements of the overall system has been the establishment of Science Parks at or near virtually all British universities, and the formation of an Office of Industrial Liaison within each university. The existence of incubator/innovation centers in the United Kingdom is virtually restricted to this setting. The models adopted for the Science Parks vary considerably, as has been their degree of success, but surprisingly the incubator/innovation centers would seem to be the one element of the Science Park program that has been reasonable successful. Some examples from universities that I visited are as follows.

Aston University, Birmingham

The Aston Science Park is located on a twenty-two acre landscaped site adjacent to Aston University and within walking distance of downtown Birmingham. It is one of the most successful of the Science Parks. The incubator is the core of the whole Science Park, conceptualized as the focal point of the whole operation. The notion is that most companies in the science park will gestate in the incubator and then gravitate to a location elsewhere in the science park.

The Science Park has sixty-five companies, thirty-nine of which had incubated there. A total of eighty-five companies had been associated with the park, of which six had failed. Eight

start-ups came out of Aston University. The incubator itself provides small high-quality space ranging from 15 to 465 square meters that is customized for research, development, and prototype production. Companies graduating from the incubator move to production space, which is available in multiples of 465 square meters. The underlying concept of the Aston Science Park incubator is the bringing together of three important elements to underpin the development of technology driven and technology oriented companies, namely (1) the usual array of management support services found in incubators, (2) seed and venture finance, and (3) access to the academic strengths of Aston University. The financial capital support ranges from 10,000 to 25,000 pounds for all stages of development, including start-up. The University collaboration is largely from the science, engineering and management units and includes access to the University's computer network, library and information services, and research equipment.

The Science Park Director (Harry Nichols) made some interesting observations. First, the City of Birmingham tends to suffer from being the location of branch plants but few corporate headquarters. This major initiative then is a deliberate attempt to try and foster home-spun entrepreneurship as the basis for a more balanced business sector in the future. Second, the linkage to the University is important as much for the signal that it sends to the outside world as for what the University actually provides. The number of start-ups out of the University have been somewhat disappointing, although this is expected to improve. Third, it is imperative to operate the science park as a business venture, with long-term horizons, and not as a bureaucratic unit. The park itself is operated by a managing company called, Birmingham Technology Limited. This is a partnership of the City of Birmingham, Lloyds Bank, and Aston University, who provided the initial capital of 2 million pounds. Fourth, the key to success has been the availability of seed and venture capital, in addition to the management support and the academic dimension.

University Of Cambridge, Cambridge

The Cambridge Science Park is world renowned and has been written up in a book The Cambridge Phenomenon. The park was established in 1970 by Trinity College, a college of the University. It houses around seventy companies, with about one quarter of these being spinoffs from university research. The covenants are designed to ensure a strong technology and research element and the management of the park is such as to maintain very strong links with the science and engineering elements of the university.

Trinity College itself gets its return from the land lease. The facility overall occupies 130 acres, located several miles from the campus, and other than some starter units for smaller

companies, or "listening posts" for larger companies on a short lease, the buildings are owned by the leasing companies.

The Cambridge innovation center, adjacent to but separate from the Science Park, is sponsored by St. John's College. (This is analogous to having our College of Liberal Arts and Sciences at KU sponsoring an incubator near campus.) The innovation center opened in 1987, and currently is near capacity with 75 companies, all of which are spinoffs of research within Cambridge University. Indeed plans are in place for another building to be added in the next few years.

The unique element about this venture is that it is directed by units of the university itself. Cambridge is, of course, Britain's top or co-top research university, and yet it is remarkable that the university has been able to foster so many spin-offs from its own research activity.

University of Manchester, Manchester

The Manchester Science Park is a joint venture between the city of Manchester and the University of Manchester, with the support of some major UK companies. The park is largely devoted to incubator space. The first building opened in 1984, offering 24,700 square feet, and the second, in 1990, is 32,000 square feet of multi-occupancy accommodation units. Major finance for this project was provided by national government grants and significant support, in terms of land and finance, from the city of Manchester. A third building is planned in the future with support largely from the private sector and drawn from major pension funds. There are 22 companies in the initial building, 14 of which have relationships with the University. Nine of these were spin-offs of university research.

The city objective is to enhance the entrepreneurship of technology oriented development to broaden its economic base, while the objective of the University is to provide the basis for the University itself to gain from the research development, either in terms of enhancing the University's academic research or in terms of additional finance back to the University. In relation to the latter, the University has established a company called Vuman with an investment (by the University) of \$1 million, to commercialize University research and patents. I would characterize the objectives as really being to broaden the research base of the University in the long-term, and to enhance the university income stream in the short to medium term.

Heriot-Watt University, Edinburgh

The creation of the Research Park at Heriot-Watt University was at the initiative of the University itself. It initially allocated 22 1/2 acres for this purpose, immediately inside the main entrance of the campus, to reflect the University's commitment to its policy of active collaboration with industry through the research park. The research park now comprises 45 acres of which 40 have been assigned to tenant companies and the remaining 5 to university sponsored technology transfer institutes. The motivation of the University is essentially that it is extremely important for a science and technology university to have close links with industry. The benefit is seen largely in keeping its teaching and research mission at the cutting edge. An additional 115 acres of land have been purchased for future expansion of the Park.

At present there are 33 organizations located in the park employing 600 people, 88% of whom are graduates. The park has a mix of spin-off companies from the University, external companies, and the technology transfer institutes of the University itself.

Sixty-two percent of the companies are Heriot-Watt spin-offs. The covenants of the park are such that only companies with a clear commitment to working with mainline university departments are allowed in the park. Some other unique features include the fact that the University has no partners in this venture; the University provides all the finance for infrastructure development, a portion of which it has borrowed. It is run as part of the University, and has been largely self-supporting. The companies in the park mirror the strength of the University, including such areas as offshore petroleum, electro-optics, electronics, computers, and systems. There is a small board of directors, half of whose members are drawn from industry.

It is worth noting the concept of the technology transfer institutes. There are seven of them at present. Their mission is to commercialize new technology developed within the University, that is find suitable applications, develop products, and license them.

In contrast to virtually all other university sponsored, or associated, science parks and related activities, Heriot-Watt is somewhat unique in its avowed philosophy of seeing this as a venture specifically designed to enhance its overall academic programs rather than to generate income. A second unique feature is its focus on research. Companies in the park must be research driven before they can locate in the park. The third element to note is that there is no specific incubator per se, although there is space available to house start-ups until they are able to develop their own facility.

University of Aberdeen, Aberdeen

The Aberdeen Science and Technology Park is sponsored by the Scottish Development Agency and the Grampian Regional Council. The University has no equity in this development, which is located several miles from campus, but does participate to a very limited extent through sponsored seminars and consultantcies. The park does include a technology center, which is an incubator for technology oriented businesses. The incubator offers office, research, laboratory, manufacture and development areas from 177 square feet to 3,700 square feet per company in a landscaped setting. It provides the usual incubator services.

The first phase of the overall incubation project is near capacity. My impression is that the innovation center is achieving a useful purpose and is evidence that incubators/innovation centers can be free-standing and successful with only a very loose linkage to higher education. On the other hand, one had the feeling that the whole venture could be more productive if it did, in fact, have that linkage, particularly to a university such as Aberdeen with a strong proactive philosophy towards linkage with the private sector.

University of Glasgow/Strathclyde University, Glasgow

The West of Scotland Science Park is located several miles from the campus of the associated universities. The association of the universities is extremely weak however, and the science park is largely regarded as a Scottish Development Authority project. The purpose of including it in this report about incubators is that there is no incubator facility in the park. Partly due to this, it would be fair to say that this park is of only modest success, other reasons include the limited commitment of the universities to it and an associated lack of outreach to the private sector. The private sector is not involved other than through the limited number of companies in the park. It is clear that the lack of an incubator facility in the park is a significant drawback in attracting either spin-offs from the two universities or other attractive technology driven companies.

I M P L I C A T I O N S

There are important implications and lessons to be drawn from the history and current stage of incubator development in West Germany and the United Kingdom:

1. Incubators are a highly successful model for fostering the entrepreneurship of new companies. They are very common in West Germany, being available for both technology oriented and general small business entrepreneurship. While not widespread in the United Kingdom, those that do exist have also been consistently successful and productive.
2. Incubators should not be perceived as free-standing institutions but rather as part of the overall economic development dimension and networked with other important elements of an economic development program. The West German experience in particular illustrates that incubators function best if networked into the broader technology and innovation dimension of economic development.
3. While the importance of the link of incubators to higher education can be overemphasized, and while this link is not a sine non qua for success, nevertheless it would be fair to say that the prospects of success are enhanced if the innovation center is linked to universities and colleges in its vicinity. This is particularly so if the incubator is technology oriented. The most limited form of association is the use of the university's name, but obviously a higher level of commitment by the university/college is highly desirable. While non-technology oriented incubators are common and successful in West Germany, the greater payoff would appear to occur with respect to technology oriented facilities. This is particularly so in light of the nature of business development in this era and the significance of technology change as an important factor in today's business world.
4. The availability of seed and venture capital at or through the innovation center would seem to be a significant element in the success of many of these ventures. Indeed the Aston model of linking access to management assistance, financial assistance, and academic support, would appear to be the most desirable model if those capacities can be garnered.
5. The importance of enhancing homespun entrepreneurship of technology driven or technology oriented companies in an environment dominated by the branch plant syndrome, as exists in the midlands of Great Britain, as well as in Scotland, Kansas, and many of the states of Germany, cannot be understated. The vulnerability of states and regions to decisions made many thousand of miles away concerning investment and closure of plants in today's competitive

environment, creates an imperative for such regions and states to develop homespun entrepreneurship to achieve balance and diversification in their economic structure.

6. Related to the previous point, it is interesting to note that the West Germans are not driven by the imperative of desperation and need associated with a declining economy in establishing their outstanding technology development and transfer system. Rather there is a recognition that even in a successful environment it is imperative to stay in front of the game by fostering appropriate development, which in this instance involves enhancing the success rates of start-up entrepreneurship through such mechanisms as incubators.