

Chapter 14

***In the Grey Area:* University Research and Commercial Activity– The Case of Language Technology**

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Universities are facing multiple and partly contradictory challenges. In order to fulfill the emerging “third mission”, they have become complex organizations offering multiple societal services, such as, contract research, educational services, consulting and the commercialization of research. Simultaneously, they suffer from the severe shortage of resources while the pace of demands requiring them to deploy extra resources continues to mount. As these developments have coincided with the call for increasing accountability, transparency and effectiveness, the university system seems certainly to be on the edge of a crisis (for a detailed analysis of the seeming crisis, see the chapter by Huff in this volume). Moreover, in response to the intensifying impact of the globalization of economy, policy makers are increasingly urging universities to take on the task of fostering economic prosperity through scientific research and innovation (Nieminen 2005, Slaughter and Leslie 1997). Consequently, it has started to seem that these apparent contradictions that confront universities today are a testament that as critical institutions of society, universities must undergo internal changes reflecting those of the larger society.

The present discussion on “Mode 2” knowledge production and knowledge capitalization seeks to come to terms with aforementioned changes (Gibbons *et al.* 1994, Etzkowitz and Leydesdorff 1997, Slaughter and Leslie 1997). In some circles, the argument is ratcheted up a notch with the claim that in a knowledge-based century, universities must subsume, if not supersede many functions of the industrial spheres (Etzkowitz and Dzisah 2010). This claim is backed by the observation that there is an increasing number of academics who have taken on the entrepreneurial mantle in taking an advantage of the national innovation policies while remaining within the confines of the university (Gulbrandsen 2005, Tuunainen 2005, Shinn and Lamy 2006, Tuunainen and Knuuttila 2008). This study focuses on the challenges that such a

hybridization of academic work and business activity faces through a case study on the commercialization of language technology via spin-off firms. University spin-offs furnish an especially strategic site to study the possible contradictions of commercialized science since among the actors operating at the interface between the university and the business sector, such as patenting and licensing offices, business incubators, venture capitalists and public research institutes, the spin-offs provide often the most immediate contact between academic research and business activity.

More specifically, this study traces the developmental trajectory of one research group, which operated at a comprehensive public university in Finland, the University of Helsinki. It details the micro level practical management of academic spin-offs concentrating on the possibilities and problems that emerged, how the problems were solved, and which perspectives informed various academic and entrepreneurial actors. It contends that there are certain inherent ideals and norms that the university has come to embody that are not easily reconciled with entrepreneurial principles. Yet, some of the problems faced by the research group could have been avoided had appropriate regulations and procedures concerning the commercial activity in the universities been in place.

Universities in Knowledge Economy

The pivotal position of universities in the knowledge economy as well as in technology transfer has been conceptualized through the use of such terminologies as the ‘Mode 2’ knowledge production (Gibbons *et al.* 1994) and the ‘Triple Helix’ of University-Industry-Government relations (Etzkowitz and Leydesdorff 1997). Gibbons *et al.* (1994), the proponents of the ‘Mode 2’ knowledge production, claimed that we have in fact entered a new mode of knowledge production starting in the 1980s.¹ The transition between ‘Mode 1’ and ‘Mode 2’ represents a break from the alleged theory-driven basic science to an interventionist science produced within the context of application (Gibbons *et al.* 1994). Accordingly, in ‘Mode 2’, and in contrast to ‘Mode 1’, the problems of various societal groups and organizations are set as the starting points of research, instead of the previous focus on purely scientific questions (Nowotny *et al.* 2001:

¹ For critical discussion on this so-called epochal break, see Nordmann, Radder and Schiemann, eds. 2011. *Science and its recent history*. Pittsburgh: University of Pittsburgh Press.

65). While the Mode 2 thesis is presented at a general level, the triple helix thesis has more plausible empirical footing (Etzkowitz 2003).

However, it must be noted that the triple helix thesis contains also a speculative claim concerning the emergence of the entrepreneurial university, which is asserted to be embedded within triple helix relations (Etzkowitz 2003). This development is purported to usher in a Third Academic Revolution, which results from “an ‘inner logic’ of academic development that previously expanded the academic enterprise from a focus on teaching to research” (Etzkowitz 2004:69).² Entrepreneurial universities develop as the traditional university incorporates private business activities into its activities hybridizing them with public academic work. Though the final version or form of the so-called Mode 2 and/or entrepreneurial university is not discernible at this stage, the fact remains that universities are undergoing substantial changes as a result of the *commodification* of academic research.

Commodification, narrowly defined, refers to the commercialization of university research, but commodification is in fact a more all-pervasive phenomenon where “all kinds of scientific activities and results are predominantly interpreted and assessed on the basis of economic criteria” (Radder 2010: 3). These activities are exemplified by such incidents as the increasing practice of cost-based accounting among sub-units in a university organization (Radder 2010) and the way academics have become increasingly affected by the profit motive and market-like behaviour in their efforts to secure external grants (Slaughter and Leslie 1997). In addition to these quasi-market activities, university scientists have also taken on direct entrepreneurial roles as founders of university spin-off companies. This has, already for decades, been a salient feature in biotechnology and information technology programmes at major universities (Kenney 1986).

Although earlier studies about university-industry research relationships have paid attention to the effects of commercialization on the university practices, they have more often than not generalized from a few macro-level instances without a proper attention to the micro level realities, in which actors face the problems of commodification in their daily routines. These studies have either used cross-sectional quantitative data (e.g. Blumenthal *et al.* 1986) or portrayed in broad strokes the changing landscape of the academy (e.g., Krinsky 2003,

² For a different kind of analysis of an entrepreneurial university, see also Clark, 1998 and Marginson and Considine, 2000.

Tuunainen 2005). However, there is also a growing body of studies that seek to find out how the actors in university-industry interactions conceive of the ‘Mode-2’ policies adopted by most research funding agencies, and, more generally, the commodification of academic knowledge (see Kleinman and Vallas 2006, Vallas and Kleinman 2007, Wald 2007). In other words, though academic scientists form an integral part of the nascent transformations in the capitalization of knowledge, their perspectives are more often than not ignored and relegated to the periphery (see however Dzisah 2010, Göktepe-Hülten 2010). As such, this chapter brings a new perspective to the debate by engaging the different actors involved in knowledge capitalization through exploring the long-term developmental trajectory of a research group and its spin-off companies.

Overview of Research Technique

The data utilized in this chapter detailing the practical imperatives faced by the language technology research group is gleaned from documents over a time-span of nearly twenty years, including research proposals and reports, publications and external evaluations. Moreover, twenty-four interviews were conducted in 2000 and 2004. The interviews were semi-structured and lasted typically from one to three hours and involved members of the language technology research group, employees as well as owners of spin-off companies. In fact, most of those interviewed performed multiple roles in these organizations. The analysis is also informed by research field notes on the informal discussions with various actors in these institutions. From the interviews, informal discussions and documents of all kinds emerged a narrative of the language technology research group, a group that saw its academic path erode as it became more commercially successful.

Consequently, what follows is a story of how the borders between academic and commercial activity became blurred, redefined and finally reconstituted. It is, also, a story of the multiple roles assumed by the actors, who in the process tried their best to figure out where exactly their commitments lied. It is also a narrative about how the contradictions of commercialization found their way into the very heart of the daily interaction of a research group. While the proponents of the entrepreneurial university tend to take the perceived contradictions and conflicts of interests as indicators that the transition from one academic mode of production to another is underway (Etzkowitz 2008), a closer look at these conflicts provides a

clue as to which roles require adequate procedures and regulations and which simply become tolerated and negotiated daily.

The Case of the Language Technology Research Group

Commercialization disturbs the theoretical work here, and then it starts to be one of the most challenging dilemmas! On the other hand, you are a professor trying to promote free science, and on the other you have a firm with private commercial interest. Things went pretty well for a long time but then the younger colleagues started to consider this interaction odd—this is a sort of *grey area* that we have talked very little about in our research group (The leader of the language technology research group).

By the end of 1999, the co-leader of the language technology research group was contacted by the author in order to study this research group, which had become very successful in both academic and commercial terms. The group had done cutting edge research in the field of language technology for nearly twenty years, spinning out of its research three different firms. Two of the three spin-offs were still in business and doing relatively well. The professors in charge of the group were (and still are) also ardent spokespersons for language technology not only in Finland, but across the entire Nordic region. This is not surprising since before the late 1990s, practically all language technology companies founded in the Nordic countries were of Finnish origin. Their origins can in most cases be traced back to individual researchers or research groups at Finnish universities (Arppe 2005). Thus the language technology research group was supposed to provide a prime example of entrepreneurial science combining an ambitious academic research mandate with commercial success. However, the author soon learned that the group had only recently broken up, as many of its major researchers had left the academia. Thus, instead of trying to uncover the recipe for the previous success of language technology research group, this chapter rather details the reasons for its consequent demise.

The beginning of commercialization

The language technology research group started commercializing its research from its initial infancy in the 1980s. This development was largely a direct consequence of their research agenda. The empirically based approach of the group towards developing language independent theories and tools to manage and analyze unprocessed text bred important early applications. These breakthroughs, particularly in computational morphological disambiguation, propelled the group into instant attention, with orders from large Finnish companies and government offices which needed new language-technology applications, especially word processing tools. These orders were managed through the department's administration and written in the form of formal research contracts. With the inflow of revenue, the department bought computers, which were very expensive in those early days: for instance one Mikro-Mikko computer that was bought as a part of one contract with a large Finnish publishing house cost more than the yearly budget of the department. The resulting money and equipment were more than welcome to the department, which had, like many other small departments in the humanities, constant problems in gaining funding for its activities.

Nonetheless, the department had some difficulty in fitting the extra income attained from such contracts with its yearly budget, as no clear procedures existed for chargeable service and research at the university. In trying to solve such problems, the leaders of the group, i.e., the professor of the department and the principal researcher of the group, approached the university administration. In the mid-1980s, the attitude of the administration towards commercialization was negative: the university did not want to have anything to do with it. Similarly, the professor who led both the group and the department argued that the commercial orders received had nearly nothing to do with scientific research. In his opinion, the personnel at the university were expected to do research instead of engaging in commercial activities. As he stated:

It was sort of selling. Those contracts were not genuine research contracts in the sense that we would have needed to do research to execute what stood in them. In fact, we just sold programmes that were already made here...Of course, some configuring work was done.

Eventually, in 1987, the professor and the principal researcher of the group decided to go ahead with the commercialization idea and established a company into which all commercial activities

were transferred. In the beginning, the activities were on a small scale, with the principal researcher working part-time for the company. As he also obtained a professorship in the department in question, the company hired its first full-time employee to replace him. The company grew rather slowly in the beginning, relying on projects of diverse kinds for which it hired researchers from the department typically for a few months at a time. In the mid 1990s the company started to grow faster largely due to large contracts with a big international information technology company.

However, in spite of this development there were lingering problems due the fact that the two professors owned a company that was commercializing research done in their academic department. The department was criticized by some faculty members for overly concentrating on language technology. In their view, the department should have had a wider research orientation as it was expected to be responsible for the entire discipline of general linguistics. Later on, also the quality of the research done in the department was questioned. However, already before these criticisms, internal tensions grew within the group owing to the disagreements concerning the ownership of intellectual property and the allocation of academic credits.

Balancing academic credits with intellectual property rights

One of the ways in which the tension between the two institutional orders broke out in the case of the language technology research group was related to the characteristic ways academia as opposed to business categorize their achievements and 'ownership'. Whereas the origin or 'ownership' of ideas in science has traditionally been indicated by credits given to colleagues, the more formally defined intellectual property rights indicate ownership in business. Property ownerships convey to the owner both the exclusionary right, that is, the right to exclude others from using his/her property, and the right to appropriate economic returns (Owen-Smith 2006). The situation is different in science where scientific articles do not have such exclusivity and others can use findings to further their own research. Moreover, there is no monetary cost involved in giving others credit. However, in the case of the language technology research group, the relationship changed because of commercialization: the disagreements concerning the

economic rewards unleashed also a latent struggle within the group concerning academic priorities and credits.³

The language technology research group proved over the years to be highly successful in both academic and economic terms. Apart from some big international research projects, it succeeded in acquiring, on constant basis, significant amounts of other external research funding. As a result, the group hired more scientists who continued the tradition of merging academic research with business. The new and mostly younger researchers licensed the programs they developed to the company owned by the professors. Soon the younger generation began to think that their contribution to the economic activities of the professors' company should have been institutionalized. In other words, they expected to be given shares of the company. Despite some preliminary negotiations, the professors did not consider accepting the younger researchers as shareholders. This created a poisoned research atmosphere within the group. The younger generation attributed the reluctance of the professors to accept them as shareholders to the professors' inability to recognize that despite their pioneering work, the technology was not the fruit of the professors' research only.

The implicit boundary between the 'original innovators' and the 'subsequent developers' that was created into the research group was contested by the younger generation also in their research articles. In them they questioned the professors' assumed priority on two fronts: firstly, they singled out predecessors for the professors' own innovations and, secondly, they delineated some other forerunners than their professors to their own work. These disagreements relating to academic credits worsened as the company started to market the licensed programs as if they were developed in the company. In the field of language technology there is a cornucopia of researchers from within the university and the commercial world. Apart from new ideas also innovative and critical tools are all highly appreciated and traded within this instrumental community (cf. Mody 2006). However, as the company sold the programs as if they were developed by the firm and not by the researchers of the department, the researchers never received the academic credit they needed to advance their academic careers. The roles of younger faculty in developing the technology remained partly unrecognized, even in the academic context. The situation was described by one of the researchers:

³ For a case in which commercialization terminated a long-term scientific collaboration between two research groups, see Saari, E. 1999. "Dynamics of collaboration: The case of Finnish and American aerosol research groups." *Science Studies* 12(1): 21-43.

We travelled abroad a lot in those days and nearly every time when we presented our work, we were asked how our work was related to that of the professors' company, that is, didn't the company do it much better...we were thus not given the credit we deserved.

The managers of the firm (who were not the professors who were only the major shareholders of the company at that time) saw the situation differently. As the former sales manager described the situation:

When you start to negotiate a real commercial utilization with international IT companies, you need to have full intellectual property rights to the programs and to their codes. In this kind of a situation you really do not want to highlight the fact that you did not develop the program in the firm, since the next question would be whether you have the code and whether you can support its application.

To this the former managing director of the firm added that in his opinion it was totally correct to market a licensed program as a product of the firm, since the firm took the responsibility for the further development and the technical support of the product.

These disagreements about intellectual property rights and academic credits originated largely because the two professors⁴ set up the company originally to manage the commercial contracts received by the department without paying too much attention to the intellectual property and academic credit issues. This mirrors the question of who has the right to benefit from publicly funded collective research work. The members of the group faced a rather fundamental question: how should the economic rewards of collective research be distributed among diverse contributors? As there were no clear answers to this question, the disagreements escalated to involve the academic priority and credits as well.

Interestingly, the two professors also thought that their company should have made it clear that the technology it was promoting was developed by the researchers working at the academic department. However, the professors did not think that they were to blame of the inflamed situation since they had externalized the business activity from the university. They accused the managing director of their own company for the misunderstanding about the origins

⁴ Later, the principal researcher was also appointed to the position of a full professor. See above.

of the commercialized technology. From the perspective of the younger researchers, the professors should have done something about the company's policy since they were on its executive board. The employees of the company held a similar view. They thought that the professors—the principal owners and board members of the firm—should have assumed a stronger leadership of the commercial activities of the company, especially in the middle of the IT crash that took place in Finland at the turn of 2000s. One of the managers of the firm who was also a post-graduate student at the home department of the spin-off company explained:

I think that [the professors] took the company seriously enough, for instance they took always part to its strategy meetings. But since their primary occupation was in the university, they always prioritized it, and the company became second.

Thus both the researchers in the university and the employees of the company were of the view that the professors should have been more interested in the activities of their company. Some employees were also confused by the way the professors acted as spokespersons for the entire Finnish language technology branch in international circles. In their opinion the professors should have highlighted the strengths of their company instead of heaping praise on the entire Finnish language technology industry. It, therefore, seems that despite their efforts, the professors were not too successful in managing their multiple roles as academics, principal owners of a company, and representatives of Finnish language technology. They tried to manage their multiple duties by keeping their academic work separated from their business activities but the fine line they tried to draw between the two activities was contested from both sides. By holding important positions in both academe and business they were supposed to assume equal commitment to both.

The openness of communication and the quality of research

Apart from the strife on intellectual property rights and academic credits, difficulties were also brewing in other fronts. After a long period of academic and commercial success, the department received, in the late 1990s, a very disappointing research assessment evaluation. The evaluation report stated that:

Given the high degree of excellence that the department achieved in the eighties and early nineties, the results for the period covered by this evaluation are disappointing. Considering the level of support and the number of people involved one would expect to see more interesting results and more scientific output.

The evaluators were worried about the impact the commercial ties were having on the kinds of research being conducted and the overall research focus of the department. In their opinion, there was a real danger that the group's initial success in commercialization was shifting the research focus from "scientifically interesting but 'difficult' issues to problems whose solutions might be more financially rewarding." Also, though the evaluators admitted that the commercial success of the methods developed 'validate the value of scientific work', they were worried that the "presence of competing commercial interests in the same department gets in the way of a free exchange of ideas." Indeed, the exclusiveness of commercial property rights and the related secrecy do not fit well with the academic norm of open communication. But apart from that the situation faced by the research group was further complicated by the fact that frustrated with their exclusion from the professors' company, the younger generation set up a company of their own in 1997. This created a secretive atmosphere within the group. In the words of the other professor:

For some years already we have had the problem that the whole truth has not been laid out on the table either in our internal discussions or in our publications...It is a big ethical problem, indeed. How much you can hide—and still act as a credible academic researcher—when you know that you have something that is commercially relevant as well?

A disagreement concerning one doctoral dissertation provides an apt example of the contradictions the researchers of the group encountered while simultaneously trying to fulfil the requirements of both academia and business. The doctoral candidate in question belonged to the group of younger researchers who had established their own company. He was accused of being intentionally vague in describing a new parser he had been developing. The university grading committee made the following remark concerning the thesis:

XX...has in some important points, especially when it comes to algorithmic descriptions and design principles, refrained from the scientifically detailed descriptions that would have been desirable. This is contrary to the principle of openness that is central to science.

In the opinion of the doctoral candidate he had only acted in a way that had become a departmental convention. Moreover, he referred to the new policy of the University of Helsinki concerning innovations and academic research:

When we were starting our company I went to a couple of functions organized by the University of Helsinki. At one of them the Rector of the university was speaking...and his message was that there was no sense in telling everything to the Japanese and Americans and letting them collect the money from our innovations. The university needs publications but it does not mean that all things should be revealed.

As for the other worry of the evaluators - the apparent turning from the 'difficult' issues to the easier but financially more rewarding problems - the professors started themselves to consider that their success in gaining external funding also contributed to the very erosion of the successful scientific research program. They argued that external grant requirements exert strong pressure on researchers to meet grant objectives, and the numbers of projects that the researchers are simultaneously involved in prevent fresh and innovative initiatives. As the other professor noted:

I am a bit worried about this development [towards commercially motivated projects]: money pours in of course, and the students get funding, but these projects have usually rather short time spans and concrete problems, which need to be solved in one way or another. One danger is that theses do not get ready but that what is being done is usually beneficial for somebody, but does not really add to the academic competence of the younger researchers.

Last but not least, the evaluators also shared some of the fears of the faculty who had since the early 1990s been complaining about the narrow focus of the Department of General Linguistics, where the language technological research took place (see above).

Convergent Cultures

Studies on the university-industry interactions have highlighted the increasing institutional convergence between the two (Vallas and Kleinman 2007, Owen-Smith 2006, Kleinman and Vallas 2006). As Steven Vallas and Daniel Kleinman pointed out, this convergence is asymmetrical in that “the market pressures and entrepreneurial practices increasingly pervade academia, even as university-like codes and practices are adopted by science-intensive firms” (2007:7). It is not surprising then that the spin-off companies started by the members of the language technology research group followed a similar trajectory. Both firms were science-intensive in the sense that they sought to capitalize the cutting edge research done by the group. However, the drive to conduct research necessary to sustain the growth of the companies and the flow of scientific ideas within the department became a double-edged sword.

In a much broader context, there is an inherent assumption among the staunch advocates of the entrepreneurial university that innovative academic research spawns good commercial products. In terms of the entire language technology branch in Finland, the stark reality was that the commercialization of language technological research proved to be complex activity with several barriers to maneuver. Turning academic research into viable commercial products is both time and resource consuming, and there is the likelihood that advanced technology might not necessarily be a unique selling point because of three interrelated issues. Firstly, language technology has its unique problems in that it provides no such fantastic grandiose visions to lure venture capitalists as, for instance, biotechnology does. Secondly, it is an embedded technology that is not visible to most of the end-users. Thirdly, the market for the language technological tools is dominated worldwide by one big company, and fourthly, the products are easily reproduced and copied. Also, the small size of the companies within the Finnish language technology sector and the fact that the entire industry was based on spin-offs from university research caused problems. Consequently, the inability to attract venture capital coupled with the

failure to raise enough funds from other sources negatively impacted the ability of the spin-offs to continue on their initial innovative growth path.

In fact, most of the academic owners and employees of these spin-off firms admitted that they had a more rosy vision of how to sell their programs than what turned out to be the case. The younger researchers who set up the new firm indicated that their intention was to continue academic research in tandem with managing the company. However, they found out that this was practically impossible. They reflected upon the lessons learnt:

Innovation is just a tiny piece of a certain product, and that again is just a tiny bit of the whole process of getting the product into the international market and to be able to also sell it there. The programs made by the university researchers are not ready to say the very least. We were more optimistic about that in the beginning. But the needs of the users are so different. It is absolutely not enough that the output of the program is correct. It has to be produced in a manner that it is easy to introduce, and it has to be adequately supported...Because of this it is not conceivable that—making saleable products—would be done as a secondary occupation in the academic world.

In addition to the small size and the lacking financial support of the companies, their academic company culture proved to be commercially unproductive. When in the 1990s the company owned by the professors was expanding heavily, the managers that were recruited from the business sector found out that the culture of the spin-off company was too heavily bound to the values of academia. While academics praise theoretical ideas and original solutions, in the commercial world emphasis is placed on usability, supplementary services and existing demand. One of the former chief executives of the professors' company complained about the perfectionist attitude of the employees - most of whom were recruited from academia - as well as about their "slight contempt" for simple commercial tasks. A former sales manager of the professors' company summed up the situation in the following way:

When the company started to grow out of its earlier research group like guise in the 1990s, we found out that the interests of the research and those of the company were not necessarily congruent... Those things that were 'hot' in the academia, like speech technology, were still far off from anything that could be commercialized, and things that

would have been easily converted into saleable tools, such as terminology extraction and spell check, were not at all considered as interesting in the research side...

These differences in aims became apparent when the company started facing commercial problems during the *Dot-com Bubble*. It had invested too heavily on developing speech technology, which in retrospect turned out to be overly optimistic. Moreover, the professors, who still sat in the executive board, were reluctant to dismiss personnel, who were largely their former students. Thus, the company became financially strained and was eventually sold to a larger corporation.

Boundaries Blurred, Redefined and Closed

The story of the language technology research group can easily be cast in terms of boundary work (Gieryn 1999, Kinchy and Kleinman 2003, Tuunainen 2005). The commercial activity it engaged in gave rise to conflict-ridden work of drawing boundaries (Tuunainen and Knuuttila 2009). At the different stages in the development of the language technology research group and its spin-offs, the actors had to redefine the relationship between scientific research and commercial activity. The boundaries of the two activities were blurred to begin with, but as the commercial activity grew in volume, a separate company was established. Though the professors believed they had established a boundary between their academic and commercial activities by externalizing the task of “marketing” to the company, neither the researchers nor the employees found the boundary erected justified.

The disagreements revolving around the drawing of an artificial boundary between the research group’s academic and commercial activities were further complicated by the exclusion of the younger generation of researchers from the participation on equal basis in commercial activities. The professors, too, began to feel increasingly uneasy about the situation, as the other one of them explained:

we were no longer credible professors once we had a firm that applied the research done in the department...I understand more than well that the other researchers were worried about, or at least secretly wondered in their minds what was going on...

When the younger generation of the language technology research group established their own company the situation became even more complicated. Earlier the participants could act as if the commercial activity and its responsibilities were relegated primarily to the business side of the boundary. However, with the breakaway group establishing a rival company within the department, the business interests and boundary-work had now found their way into the very heart of the department's research activities. Eventually, at the end of the 1990s, the key younger researchers gave up their academic careers and moved to work for their newly formed company. This practically meant the end of the language technology research group. The professors, however, chose to remain within academia; withdrawing themselves from business activity by selling off their company to a larger corporation.

Consequently, the conflicts ensuing from hybridizing academic work with business were resolved by separating the two activities from each other. As a result, the business activity and its dedicated actors moved away from academia that from the perspective of the university was not a satisfying resolution, as many competent researchers were lost and a successful research program terminated.

In the Grey Area?

The visions of hybridizing and transforming academic research, which are encapsulated in such models as the 'Mode 2' and the 'triple helix' of university-industry-government relations assume typically in a constructivist fashion that the existing organizations may willingly be moulded into new formats. However, as the case of the language technology research group shows, there are certain inherent ideals that the university has come to embody that cannot readily be reconciled with the dictates of entrepreneurial activity. Even though the language technology research group seemed to provide a prime example of the entrepreneurial science, its development ran oddly against the tide of the official research policy: the group began its commercialization process long before the widespread notion of academic capitalism gained common currency in Finnish academia, and the group dissolved in an entirely different institutional context in which the outspoken science policy was to enhance the commercial application of the academic research. The close empirical analysis into the reasons for this development revealed several problems and

contradictions, some of which seem easier to solve than others. This applies especially to those problems that were due to the lacking institutional setting. When the language technology research group started its commercialization, rules and regulations that could have governed the process and pre-empted many teething problems were absent.

The institutional landscape in Finland has since then changed and such problems as the establishment of two competing spin-offs in the same department are highly unlikely to occur. According to relatively recent legislation in Finland, universities rather than individual researchers have the rights to innovations born out of externally funded projects. Moreover, the language technology research group had tried to license their programs through the former technology transfer office of the University of Helsinki only to find out, as the other professor put it, “[this TTO] could not do it: they did not, in fact, either market or sell”. On this front there has also been considerable improvement as a new larger and more resourceful technology transfer office was established in 2001, owned by the University of Helsinki and the State of Finland through VTT Technical Research Centre of Finland, which is the biggest research organization in Scandinavia.

The issues of the openness of scientific discussion, the one-sidedness of research and the possible deterioration of its quality are much more difficult to resolve because of the direct impact they have on teaching and research. Time will tell whether the potential side-effects of the capitalization of knowledge will be tolerated by the academia. Commercialization is also potentially harmful to scientific collaboration as research is an informal, cooperative and relatively anti-hierarchical endeavour. It is plausible that commercialization may obstruct these cooperative and collegial relationships. Although one must add that also academic status competition hinders cooperation and the free exchange of ideas (Vallas and Kleinman 2007).

From the commercial point of view, one of the most solid doubts concerning the prospects of the entrepreneurial university is the commercial viability of university start-ups. The question that must be asked is whether academics can be considered the right actors for business activities given their characteristic interests and motivations. As Göktepe-Hülten (2010) indicates, patenting is often regarded as a part of a scientific research programme rather than an end in itself. Giuri *et al.* (2007) and Gulbrandsen (2005) point out, in turn, that solving interesting research puzzles, gaining recognition, and getting personal satisfaction are important factors pushing forward the desire to commercialize. This explains why in spite of the available

expert knowledge base, the incursions of academics into the realm of business have produced only little success. This assessment applies also to the case of the language technology research group. The professors derived little dividends from their companies and the strategic direction of the company was largely based on the academic interests of the professors. As such, many important decisions were not made on sound commercial basis but rather with academic motives, leading to several complaints by the managers recruited from the world of business.

Also the manner in which the question of intellectual property rights escalated in relation to the issue of academic credits showed how difficult it is to bridge the diverging academic and business practices. The commitment to the traditional university values might also explain the uneasiness the two professors felt about their multiple roles as academics, entrepreneurs and major actors in the Finnish language technology scene.⁵ This led them to choose to leave the commercial activity altogether for which the company merger gave a convenient opportunity. Another reason for their prioritizing the university even at the expense of their own firm was most probably due to the impossibility of taking care of too many things: teaching and supervising, doing research and leading a research group and a company commercializing its research. There are good reasons to ask whether the university personnel is able to manage all the different tasks that have recently been assigned to them.

Conclusion

The case of the language technology research group provides also a good example of the gap between discovery and application. Innovations can take long time to mature and the crucial inventions are often made well before the technical, not to mention the commercial, possibilities of utilizing them even exist. For instance, the two-level morphology, on which a big part of the commercial activities of the language technology research group was founded, can be traced back to the generative model of the phonological structure of the English language developed by Chomsky and Halle (1968). Their seminal work inspired discussions on general modelling of phonetic or phonological structure (Jakobson *et al.* 1952). Of course, the whole branch of

⁵ The two professors were remarkably active and visible also in other fronts. The other professor functioned also as a Dean of the Faculty of Arts at the University of Helsinki and the other one in turn was the central actor in the successful initiatives to get more external and public funding to the language technology sector in Finland and even in Nordic countries.

language technology would not have existed without computers. Moreover, when the language technology research group was established at the beginning of 1980s, personal computers were a rarity. Thus, it took ten years from the research group to turn the two-level model into a substantial commercial income. This was because the technology was developed using multi-programming operating systems with virtual memory in a university setting. However, the operating system that allowed for running multiple applications with genuinely flexible and sufficient virtual memory spread broadly to the consumer market only after the introduction of the *Windows 95*. Already this example from such a practically geared and instrumental field as language technology shows that the idea of a new mode of research done in ‘the context of application’ may - if taken too short-sightedly as the major criterion for funding - actually impede innovation activity.

Last but not least, due to the free and open source software the domain of language technology appears to be on the verge of moving also beyond the entrepreneurial mode already. To be sure, the availability of free program code was a norm among the academic researchers even before the dawn of commercialization. For instance, the second flagship innovation of the language technology research group, the constraint grammar, never got the international recognition it deserved due to its early commercialization. Though the professors’ company distributed it free of charge to research institutes, it never spread so widely as researchers were not given access to the code. The practices of free and open software development seem to fit better into the academia than the imperatives of business activity. It will be interesting to see whether, and on which conditions, anything like that could happen in other, more investment-heavy fields.

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