

# **Theory and Practice in University-Industry Collaborations: An International Case Study**

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## **Conflicts of Interest Arising from Industry-University Interactions**

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The attached draft document is the first part of a study on university-industry collaboration in which six universities (Technical University of Braunschweig, Germany; Heriot-Watt University, Scotland; University of Washington; Carleton University; University of British Columbia; and University of Ottawa) have participated. Interviews took place between 1999 and 2001. The draft, which was written by Tim Padmore, is circulated for information. The team would be thankful for comments and corrections of errors of fact or interpretation.



# Conflicts of Interest Arising from Industry-University Interactions

## 1 Introduction

*“The future of the university depends on doing this right,” University of Washington administrator*

To act correctly is the daily challenge imposed by every community on the individuals who comprise it. It could even be said that the *main function* of a community is to provide its members with the means to meet the challenge of "acting correctly."

We present here some of what we have learned from our case studies of how universities define correct action; what tools they provide to administrators, faculty and students; and how the tools work in practice. To make the discussion manageable, we will take a specific perspective: *conflicts of interest*. Further, we will only look at conflicts of interest that arise from the university-industry interface. More particularly still, we focus on the interface as it has developed in the last 20 years or so. That is, within the personal experience of the people we have interviewed and as reflected in the institutional frameworks at the time of the study.

Universities are among the most complex communities that have been devised by humankind. Society has many and high expectations of universities. Universities are full of clever people, tolerant of complexity. As a consequence, we did not expect nor did we find, clear, consistent and simple frameworks, but rather idiosyncratic, many-layered and evolving patterns of expectation, incentive and behavior. We observed some common principles, many inconsistencies and a few contradictions.

An easy place to start is to examine the written policies of an institution. Overarching conflict of interest statements have been published by three of our universities. The University of Washington has the most elaborate set of published policies, including a chapter on Employee Conflict of Interest<sup>1</sup> that links to many other policy areas and strongly reflects state laws dealing with conflicts affecting public employees of all kinds. The document is legally precise but would not be easy for a casual reader to interpret precisely. The University has a number of offices, such as the Office of Scholarly Integrity, that are designed in part to assist members of the academic community to consistently apply university policies. The University of British Columbia refers to Policy 97: Conflict of Interest, which is less weighty than the University of Washington policy. It distinguishes three types of conflict according to their remedy: those that require disclosure only, those that require prior approval, and those that are prohibited. The University of Waterloo has published a conflict of interest policy<sup>2</sup> that describes in a

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<sup>1</sup> University of Washington Handbook, Volume Four (General Information and Selected Rules and Policies), Part V (Employee Privileges and Obligations), Chapter 2 (Employee Conflicts of Interest), which follows Preamble (A Statement of Principle – Academic Freedom and Responsibility) and Chapter 1 (Employee Responsibilities).

<sup>2</sup> (Policy #69, University of Waterloo Policies, [http://www.adm.uwaterloo.ca/infosec/Policies/Policies\\_num.html](http://www.adm.uwaterloo.ca/infosec/Policies/Policies_num.html))

general way, with supporting examples, some of the conflicts that may arise for faculty members. Examples, however, make it clear that the 1991 drafters had in mind conflicts involving behavior that is clearly improper or irresponsible – “headline conflicts.” Our discussion is quite a bit broader, covering any situation where a person is pulled in two directions by contrary incentives or expectations. The Waterloo procedure for resolving conflicts is simple and permissive: it is up to the faculty member to recognize a possible conflict and they may discharge the conflict by disclosing it to a supervisor; the supervisor determines if a conflict exists and the two then agree on how to resolve the conflict, with the help of other parties if needed to reach agreement.

By and large, however, conflicts of interest are not addressed by formal mechanisms and codes of conduct as much as they are through traditions, expectations, tacit acceptance of responsibility and ongoing debate and testing of assumptions against experience (Campbell and Slaughter, 1999). Two trends might change that balance. The complexity of university-industry relationships is growing, and the stakes are ever bigger. The commercial importance of knowledge generated in the university is now very significant, and a growing share of the money flowing to public universities comes more or less directly from the private sector. Consequently there is a growing sense within public bodies of a need to manage the university-industry relationship in the public interest. Complexity and accountability create an incentive to formalize policy. For example, at the time of our study the University of British Columbia had just created its policy “handbook” covering trademarks, research, sponsorship and many other matters. The handbook is meant, said a university administrator “to replace a system based on tacit knowledge in the custody of senior and experienced staff, which had started to break down due to rapid change.”

We will present the evidence of conflicts of interest with respect to their impacts on just two groups inside the university: the faculty, and the students. That is not to say that there are no other important groups in the university, especially in relation to a discussion of management of conflict of interest. Notably, there are administrators and also governors of the university, who bear the ultimate responsibility for institutionalized ethical systems. The position we take is that the most important *impacts* for the university are the impacts on students and the impacts on faculty. We note that students and faculty are the primary producers of the university's basic outputs: discovery and learning.

The discussion, however, will deal with the *interests* of many groups. In particular, we will deal with the interests of industry, of firms and of the employees, managers and owners of firms. We also include the “public interest,” which is often revealed to universities through the actions of legislatures, ministries, and granting councils or informally but no less compellingly, through the media or personal contact (Benjamin, 1993). The public interest is of course not a single interest but a set of interests with ample scope for internal conflict, for example comprehensiveness *vs.* excellence, or fiscal restraint *vs.* unfettered access to education.

A conflict of interest occurs when a reasonable act that would serve one interest at the same time compromises another interest. The responsibility for resolving the conflict may or may not rest with the person affected. For example, a professor undertaking a consulting project for the military may feel obligated to balance the business opportunity against a sense of social correctness, and the balance is generally up to him or her. On the other hand, a student who accepts a co-op placement may properly feel it is up to the firm and the university to establish minimum standards for balancing the financial interest of the firm and the educational interest of the student. The ambiguity of responsibility is resolved in different ways by different institutions, another reason why the discussion is organized according to the impacted groups.

Section 2 discusses the *interests* of the main parties in a little more detail. As a preamble to the main analysis, Section 3, sketches the *culture* of each of the six universities, which greatly affects the way in which they deal with knowledge production and dissemination issues (Tierney, 1991). Supplementing the culture discussion, we take a brief look (Section 4) at conflicts that affect the institution as a whole, and therefore help shape institutional responses to conflicts that impact its members. The following two sections (Sections 5 and 6) look in detail at conflicts of interest affecting students and faculty, respectively. For each of the two groups, we will look at different *modes* of industry interaction, e.g. on-campus research partnerships or teaching inputs, and try to say something about the conflicts that can arise and how, in practice, they are resolved. The discussion provides some evaluation of the seriousness of each type of conflict<sup>3</sup>, and the nature and effectiveness of the mechanisms for dealing with the conflict.

## 2 Interests

*“Putting theory into practice. Learning what it takes to move a great idea from the research lab to the marketplace. Making contacts that will help you land a job after graduation. Helping pay for your education,” Information for New Students, University of Waterloo Cooperative Education Programs.*

For *students*, the principal goal is evidently education. The broad notion of education needs to be broken down a little to make the analysis useful. There is the educational level (graduate or undergraduate) and the educational goals (general, disciplinary, skill-specific). In the context of industry interactions, co-operative education is especially important, where interests include the type and quality of work placements, the amount of involvement by teaching faculty, and opportunities for permanent employment. Other “employment interests” include the effectiveness of the training side of education, reputation of the university or program, and informal and formal contacts with employers, including placement services. To the extent that students are involved with commercially valuable research, students also have significant financial interests in the intellectual property they create. (Atlantic, 2000).

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<sup>3</sup> In assessing the seriousness of conflicts, we consider the potential impact, the balance of power, as well as the degree to which the interests of the different parties are misaligned.

For *faculty*, the spectrum of interests is more complex. Because faculty members have a certain responsibility toward the success of their students, they share many of the student interests, not only the education interests but also, particularly for graduate students, their employment related interests. Moreover, all of the universities we studied have significant research aspirations, the self-interests and responsibilities of faculty therefore include, and indeed are often centred upon, the research enterprise. Increasingly faculty are also seen as having a major interest in community service, most notably for us, in building productive partnerships with industry. Finally, there are very important *self-interests*, including prestige, financial reward, and intellectual adventure. Industry interactions are now more important as a source of financial rewards, which in singular cases can be spectacularly large.

*Industry* interests are more well-defined. A firm's first duty is to provide a return to its shareholders and the strongest interests for the firm are therefore related to commercial success. Even so, the great variety of industry interactions suggests that other interests may sometimes be important, often under the general heading of "community responsibility" and can include actions that do not immediately advance shareholders' financial interests (Mangan, 1999) For example, in the course of one of our company interviews -- a regional operation of a multinational advanced technology manufacturer -- the company representative identified at least 10 different ways his company interacted with the study university:

- representing industry, sitting on a committee specifying a consortium Masters in Business Administration involving several universities,
- a senior professor sitting on the company's board,
- a senior executive sitting on the university's board,
- employees taking distance education degrees from the university,
- company donations of prizes for engineering students,
- executives helping with development of a management of technology degree
- executives providing curriculum input for specific university courses,
- company employees acting as student mentors,
- providing advice on student placement services,
- offering positions for project placements required in certain courses (often leading to an offer of permanent employment),
- providing campus speakers.

Notwithstanding this dense set of connections, the company said there had been no significant research partnerships with the university, the mode usually seen as the most direct route to commercial advantage! The company has an explicit policy of community development.<sup>4</sup>

A special case is spin-off companies, which are formed on a base of technology developed in the university lab and with ownership and/or heavy involvement by the inventors of the technology. As the enterprise spins off, the interests of the spin-off firm

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<sup>4</sup> The university (Heriot Watt) has a complementary orientation. A dense network of relationships with industry is key, said a senior administrator, to high graduate employability relative to other universities (number 6 for the UK, number 1 in Scotland)

transform from being the interests of faculty and, sometimes, students, to the interests of a commercial entity at arms length from the university.

The *governors* of the university and their agents, the *administrators*, have another set of interests. Their accountability is to the funders of the university. In all six study universities, the principal funders are in the public sector. A public funder may be a city or regional government, a state government, a national government, or a combination of these, and often acting through intermediary funding agencies. The outside control is strong in some cases, for example, in Germany the federal ministry (civil servants) set strategy and operational policy, and at the University of Washington the state legislature (elected officials) takes a minute interest, particularly in the teaching side. The interests of individuals and organizations also come into play: for examples, the bureaucratic inclination to achieve order and control, and the political interest to avoid embarrassment or scandal. The *public interests* include community development, regional prestige, job opportunities, workforce development, economic investment and growth and, with respect to all of the above, value for money.

### 3 Culture of the University

There were very clear *cultural* differences between the Canadian universities and the comparison universities that affected the perception of conflicts and their resolution. These cultural differences, as will be seen in the following sections, not only affect the way in which conflicts of interest are addressed, but also and more fundamentally, affect which conflicts are seen as significant.

At the **University of Washington**, most of our respondents used the word “entrepreneurial” by which they meant that faculty show great energy and initiative in raising money,<sup>5</sup> both from industry and public sources, to support their research and teaching activities. Research is a primary objective (from the perspective of the institution) and funding is an important measure for ‘keeping score’. Both students and faculty find it very easy to make the transition from scholarly activity to working in or even starting commercial enterprises. However, the university is not organized in an entrepreneurial way, but more resembles a large corporation or government bureaucracy. While the intense entrepreneurialism of individuals is generally celebrated within the university community and by the media, it is often not trusted (Wasser, 2001). As a result, there is a great deal of policy, regulation and oversight dealing especially with conflicts of material interest (financial interest). Here is an example. The federal government and national granting agencies push American universities to commercialize discoveries. A state ethics law introduced two years before our interviews caused much angst until the university negotiated a set of exemptions to address university needs and

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<sup>5</sup> “Professors in sciences and medicine are like heat-seeking missiles,” University of Washington administrator.

developed new internal policies to address legislators' concerns.<sup>6</sup> Exemptions were needed, for example, to allow graduate students to work on company premises, and so that faculty members could accept awards and prizes. There is also some conflict between the interests of the state government and the federal government, as the state legislature is seen to be more interested in teaching than in using the university as a local economic driver.

At the three Canadian universities and **Heriot Watt** in Scotland, interviewees spoke more often of social goals, for example, teaching excellence and scholarly achievement for its own sake. Commercial success was discussed in terms of economic development and job creation primarily and in terms of individual opportunity secondarily. Student employability is emphasized more than student entrepreneurialism. The aura of social responsibility that shimmers around the university community reflects the attitudes and expectations of the larger community. Consistent with these internal and external attitudes, conflict of interest are managed with fewer and simpler formal rules and more reference to responsible behavior and peer expectations. At these universities we find the greatest social distance between university and industry, and industry generally acts as its own advocate, determining and defending its interests in dealing with the university community.

The ethical culture at **Technical University at Braunschweig** is heavily influenced by the dominant position of the professorship. Practically, the university is organized around individual professors who create systems of research and scholarship around themselves as central suns. The professor takes on most of the scholarly, administrative and management responsibilities of the unit, including management of conflicts of interest. There are relatively few and relatively broad rules set by the Ministry and the University regulating conditions of work (salary, benefits, hours of work) and use of university property. Because most professors come originally from industry, they have a good understanding of industry interests, as well of the interests of the community internal to their own institute. In principle, therefore, they are in a good position to carry out their heavy responsibilities. The university administration is poorly positioned to exercise much influence.

It has to be said that the brief foregoing analysis of university culture does not and cannot capture the diversity of the actual institutions. This is particularly true of the two largest universities (University of British Columbia and University of Washington) which contain within themselves many, contrasting cultures.<sup>7</sup>

It has also to be said that our evidence on university culture is limited because we concentrated on the parts of the university that interact most frequently and most

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<sup>6</sup> "The state law establishes broad principles to prevent state employees from exploiting their position. This works well to prevent someone hiring their brother in law to mow the capitol lawn but it complicates technology transfer enormously," University of Washington administrator

<sup>7</sup> "If you took a poll of faculty, the vast majority don't see any value in working closely with industry," University of Washington professor, a surprising view given what we heard from most.

intensely with industry. The cultures we describe are the cultures most directly involved in the university-industry interface.

#### **4 Conflicts affecting the institution as a whole**

*“The outside pressure is there, but never enough to force a decision,” University of Washington administrator.*

Our main focus is on conflicts specifically impacting either faculty or students. In this section, however, we briefly review and elaborate some of the institutional pressures that influence student and faculty conflicts.

There are pressures for universities to change the way they do business. One pressure is competition from the private sector. There now exist well-funded company-owned post-secondary institutions, like Microsoft University, that are challenging the dominance of universities in some specialties. Traditional universities are participating in the trend, e.g. Northwestern University is accrediting Motorola University: in short, the ‘corporate university’ is a major growth sector (Prince and Beaver, 2000).

Private sector interests are creating incentives for universities to collaborate with each other. The University of British Columbia has been negotiating with a dozen or more universities around the world regarding partnership with multi-national media and communications corporations who could contribute both tools and content. IBM has articulated a vision of a consortium involving some 50 universities.

Public universities are examining their mandates, which are no longer determined solely by a single public sector funder. Can and should universities change their cultures? (Davies, 1998; Wasser, 2001; Moses, 2000). Do universities customize to meet a regional focus, or do they look internationally (easier today with the benefit of new information technology)? Do they respond to pressure to strengthen the regional economy, or to increase access to secondary education, or to demands from students for more “wealth majors.”<sup>8</sup> Old debates continue: the occupational culture of professional schools, distaste in the social sciences for “practical applications” (Slaughter, 1993), the importance of liberal arts education. There is still resistance in some sectors of the academy to industry-university interactions (Fisher and Atkinson-Grosjean, 2002). So far, change is not dramatic, and universities are mostly maintaining traditional ways, and their independence. Many of our respondents said, in effect, “we are listening, but it’s we who decide.” In Germany, for example, a 1993 law permits universities to establish a board of trustees with external members, but so far in the province of Lower Saxony, where the Technical University at Braunschweig is located, only one small and marginal university has done so.

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<sup>8</sup>At the university of Washington, federal laws push the university to commercialize research, while a state ethics law on public contracts inadvertently inhibit industry partnerships, while the state legislature, according to one administrator, “wants the university to be a big community college.”

The boundaries between what used to be theoretical research and applied research have become, in many cases, indistinguishable and therefore the classic division of labor where the university does the basic research and industry does applied R and D does not work any more. Industry and university become intertwined and interdependent. Ownership of intellectual property is debated in terms of effective commercialization<sup>9</sup> and much broader public interest issues like “transparency” (University of Waterloo). Nevertheless, worries about industrial domination sound a very occasional note. Industry, said a Waterloo administrator, is not unified, and a bigger danger is government, which is.

## 5 Conflicts affecting students

*“The university’s number one priority is students,” University of British Columbia professor*

In this section, we look at conflicts impacting student interests flowing from various types of industry interaction.

All six universities are emphatic on the importance of students. Education is fundamental to the conception of a university. That said, there is much variation between institutions, among departments, and among individuals, on the weight given to the interests of students. Further, students have other interests than education -- notably, money in the present and regular employment in the future.<sup>10</sup> We will try to see how these interests are served by formal and informal processes.

Beyond what might be called material interests, many students also derive benefits (prestige, pride, a sense of social responsibility) from the correct action of their university,<sup>11</sup> extending their interest very broadly. While recognizing the fact, we accept that analysis of this issue is beyond the scope of the study.

### 5.1 Teaching-related employment

Increasingly, employment is seen not only as an output of the education process but also as a useful input. Cooperative education (where periods of university-sanctioned employment alternate with periods of full-time course work), one-time industry internships,<sup>12</sup> and industry-based course-specific or term projects<sup>13</sup> are common models.

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<sup>9</sup> "Benefit to (the) Canadian economy" is listed as an objective for intellectual property emanating both from centers of excellence, both federal and from the province of Ontario.

<sup>10</sup> At the University of Waterloo, we were told, 80 to 90 per cent of cooperative students later obtain permanent employment with one of their co-operative employers; a similar figure holds for engineering coops at the University of British Columbia.

<sup>11</sup> For example, a University of British Columbia administrator noted that students often object in principle to professors sitting on company boards.

<sup>12</sup> Professional schools often require internships for undergraduates. A University of Washington administrator said the practice is expanding as the university becomes more interested in community

Pay and other conditions of employment are variable; what the programs have in common is that the jobs are seen as contributing to the educational process and that the university takes significant responsibility for selection of the job and establishing terms of employment. In most cases, the universities (and certainly the students) recognize additional, non-educational benefits from teaching-related employment, notably an increased chance that the student will find regular employment in the future with the participating firm.

Industry likes the idea of teaching-related employment. Often, it is industry that has driven these programs.<sup>14</sup> The advantages cited by industry are mostly complementary to the advantages enjoyed by the student.<sup>15</sup> Firms cite early exposure to a potentially valuable regular employee and a connection to the university community that might promote future technology transfer (Braunstein and William, 2001), and contribution to the welfare of the larger community. Industry also cites disadvantages, which sometimes create conflicts with the interests of students: the costs of training the student; administrative overheads related to university procedures; lack of control over the candidate recruitment process (although firms can easily turn down a candidate, except in the case of projects carried out as a class project or by a research team); and pressure to structure tasks that are educationally relevant, rather than best value for money.

In no case did a university respondent report an easy surplus of placements, but neither is there evidence of a natural ceiling.<sup>16</sup> It is in neither the institution's nor the firm's interest to generate a surplus of placements. Beyond the effort involved, unfilled placements have a social cost: recruiting positions is costly and firms that have gone to the trouble of identifying a position or project are not pleased if the university does not provide a suitable candidate. All this puts pressure on students to accept an available job. How is this conflict resolved? In some cases, students are allowed or encouraged to find their own placements,<sup>17</sup> but this is a weak answer unless the student has access to expert

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service and students become motivated to "improving the robustness of their CV." At the University of Washington, a new "externship" program sees graduate students spending an academic quarter with a company, not to advance their dissertation but to gain real-world experience. A university administrator said companies had only two questions: what happens if the student gets hurt (the university is responsible) and what happens if the student finds a cure for cancer (the company owns it -- and students also sign confidentiality agreements)

<sup>13</sup> At the Technical University at Braunschweig, all engineering students do their graduating research project at a firm. At the University of Washington, which has no such tradition, there is a small program that sends fourth-year engineering student teams to do an industry project. Since there is no charge to the firm, the program is useful for small companies.

<sup>14</sup> "Waterloo and the co-op system were founded by local business," University of Waterloo administrator.

<sup>15</sup> "Students get more out of the final year after the year they have been out in industry; industry feedback is that they prefer a bachelor's graduate with this kind of experience to a master's," Heriot Watt professor

<sup>16</sup> Both University of Waterloo and the University of British Columbia have relatively large co-operative education programs measured against total employment in the relevant industry sectors. Yet the marginal effort of recruiting additional placements does not seem much different than for departments and whole institutions with much lower levels of co-operative education. If anything, it becomes easier to recruit additional places once the recruiting infrastructure and what a Waterloo administrator referred to as a "co-op culture" are established.

<sup>17</sup> A University of British Columbia administrator pointed proudly to Masters of Fine Arts students who have successfully gone out into the "angel" world to raise money for film production.

resources.<sup>18</sup> The more usual answer is to put the application process in the hands of the student and the hiring process in the hands of the firm. Larger programs typically provide students with more choice. Smaller programs, or placements organized by a single professor, offer less choice but a potential for higher quality placements, more closely related to educational requirements.

The next issue then is the quality of the menu. The *quality of a placement* is measured in several ways.

From the student's perspective, the most important is usually the *conditions of employment*: rate of pay, personal and professional development, work environment and having something interesting to do (whether or not it is academically relevant) (Wiseman and Page, 2001). Because these issues are so important to the student, and because the costs to a firm of a co-op placement are relatively high, the potential for conflict is relatively high. A variety of approaches are used. Pay and terms of employment are often standardized, at least as to a range, for large formal programs. In Germany, students working for small firms may get zero pay, but instead receive a stipend from a government program.

There is some tension between a firm's wish to solve a problem or to perform mundane as well as interesting tasks, and the university and the student's wish that the placement or project teach something – *academic relevance* (Neil-Smith, 2001). The tension is least when firms are closely involved with the academic players, for example through a personal connection with a professor or an independent research relationship. Where the relationship is more distant, for example when it is mediated by a placement service, firms may have less empathy for the academic agenda.<sup>19</sup> Screening, monitoring and follow-up are the formal substitutes that provide some protection to current and future placements. Students also bring practical knowledge back into the classroom, a mutual benefit.

The third dimension of quality from a student perspective is *career relevance*. How well does the placement serve to introduce the student to the labour market and more particularly to a potential employer? The potential for conflict is low because the student, the firm and university have generally parallel interests. The employer wants to get a look at the student and the student at the employer, while the university wants the student to get a job.<sup>20</sup> Long-term co-ops of a year or more are allowed at Carleton

<sup>18</sup> "Students organize their own internships with help from the professor, usually broken into pieces, often at different companies and internationally," Technical University at Braunschweig professor

<sup>19</sup> An intermediate model is the University of British Columbia Centre for Advanced Wood Processing, a research institute specializing in undergraduate co-operative education. It serves the interest of firms for access to students and input to programs, and provides some choice to students, e.g. some students prefer larger companies believing that they provide better learning opportunities. The centre's focus on undergraduates involves some loss of status within the university, but this is likely less relevant to students than the fact that their future employers are closely involved with the program.

<sup>20</sup> In a hot job market, the university may feel a conflict. "Firms sometimes steal our co-op students before they can graduate," said one Carleton professor ruefully, but not bitterly. New programs can create anxiety; some professors at the University of Washington were said to be worried they would lose graduate students to the new externship program.

University. They are more effective for career development (and seen as more efficient by firms) but some universities are reluctant to embrace them because they see the long co-ops as disruptive to the academic program.<sup>21</sup>

A very large program, such as the cooperative education system at the University of Waterloo, can offer a larger choice of positions and set up systematic screens that reduce the costs of assessing quality for both student job-seekers<sup>22</sup> and firms. Both large and small programs can offer job-finding services. At Waterloo, the co-op program runs “career services” funded by a student levy, consisting of workshops on job hunting and the future of work, as well as a placement service. The University of British Columbia commerce faculty organizes practice interviews with industry interviewers and helps students with self-employment.

*Intellectual property* developed by a student while working for a firm as part of a cooperative education program is governed by the employment contract between the student and the firm, which usually means that the intellectual property belongs to a firm. Conflicts can arise if the student independently develops intellectual property before or during employment (Slaughter, 2002). Unless the property is disclosed and explicitly excluded from the employment contract, the firm may have a claim to it. Coop programs generally provide model contracts, advice and support to students to deal with these sometimes-complex issues.<sup>23</sup>

The *role of the professor* in teaching-related employment varies greatly among institutions. Involvement of professors is generally very much in the student’s interest. Professors not only provide contacts with industry, they can work with industry partners to help them design appropriate positions, they can do site visits before and during the placement, they can follow up with students and with employers, and they can work relevant content into the curriculum based on the aforementioned interactions. All this is a lot of work. There are some collateral benefits to doing this work – additional industry contacts, better knowledge of industry requirements – but consistently we were told that the collateral benefits are not very large. Therefore the work has to be traded off against the professor’s overall investment in the teaching enterprise. The universities have not really solved this problem. If work experience is to penetrate deeply into the academic enterprise, then universities either give up on professor involvement and substitute administrative monitoring and screening systems (University of Waterloo) or they must have both strong traditions and hard requirements for faculty involvement.<sup>24</sup>

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<sup>21</sup> Even a conventional co-op program creates some stress to traditional routines as “each course has to be taught twice” to cover the terms when students are away.

<sup>22</sup> “Students put 3 or 4 credits worth of work into the application process,” coop director at one of the other study universities

<sup>23</sup> See for example the on-line Cooperative Student Reference Manual for the University of Waterloo, section 7.8: <http://www.cecs.uwaterloo.ca/manual/index.htm>

<sup>24</sup> At the University of British Columbia, engineering faculty are expected to do at least one site visit per company per co-op and review all the project reports. While short of best practice, this is a substantial commitment nonetheless.

There are some idiosyncratic conflicts that do not occur at all institutions and therefore do not allow for comparison. For example, at the University of British Columbia, pressures from families were noted: families of Asian students often oppose out-of-town placements, limiting the choice available to students. In Germany, foreign travel is seen as very desirable and there are mobility programs for students and researchers. Students go abroad for courses more often than for work placements; in so doing they establish credibility with local firms and links with foreign ones, either of which can lead to a job later. The interests of students, university and firms are generally aligned<sup>25</sup> in these cases, and the potential for conflict is low.

## 5.2 Regular employment

*“There is a fear we will become too market-driven,” University of British Columbia administrator*

While there is more to university education than regular employment prospects, there are very few students who would not put such prospects high on the list of expected outcomes from their university experience (Glover, Law and Youngman, 2002).

By regular employment, we generally mean career employment after graduation, especially the job(s) taken by students in the first few years after completing a university program. However, we also include under this heading work done during a break in studies, such as summer employment, and also part-time employment done in parallel with studies, so long as the work is not formally linked to the education program. Such work is important; the money and continued relationship with a firm may be essential for some students. How does a university recognize this strong student interest? At Carleton University, for example, most grad students work part-time in industry locally while enrolled part-time in the degree program. Work and thesis are usually related. The university facilitates the study style by offering most important courses in the evening

A special case is the student who has been and remains an employee of a firm and who has entered or, more commonly, re-entered the university system in order to upgrade, specialize, or expand their knowledge and skills. In numbers, the *returning students* are few but clearly their interaction with industry is very strong.

There is a classic tension between the student’s narrow interest in employment prospects and his or her wider interest in personal development, citizenship and civilization. Traditional universities tend to elevate the latter goals. Citizenship and civilization are social goals, which universities have played a central role in defining. Their interest in these goals is very great. Students may share these goals, but their personal benefit is diffused in the general benefit, so their individual interest is less; they tend to value employability over any social development, and indeed to frame their social development in terms of greater employability (Glover, Law and Youngman, 2002). Personal

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<sup>25</sup> Professors benefit from the linkages, and one Technical University at Braunschweig contact cited concrete examples of research contracts resulting from student exchanges. One institute was building a database of these placements to help with setting up company links.

development is an undiluted benefit but still less tangible than the prospect of job and a paycheck. This conflict of interest is the tension between “*training*” and “*education*.”

An enormous amount of effort, over many years (and generations), has gone into examining and resolving this tension in the context of the traditions and mandates of particular institutions and the expectations of their various constituencies. The potential for conflict is therefore relatively low, and the models for managing conflict are diverse. Some examples follow.

- In the German technical universities, a common model is for engineering students to do a graduating thesis based on a project in a company. If the study proves to be useful and relevant to the firm, an offer of employment often follows. At the University of Waterloo, the extensive co-operative education program fulfills a similar function, even though the work assignments and projects may be more routine.
- At Heriot Watt, institutional values are highly tuned to the employment interests of students.<sup>26</sup> At this institution, there is more pressure for part-time studies and distance learning (clearly favored by *returning* students who want to continue employment with their firms) than for cooperative education. The student body reflects the industrial makeup of the region, which historically is not very entrepreneurial, and this may account for the heavy emphasis on employment prospects. Carleton, the comparison university, is a contrast in this instance, as it places a high value on student entrepreneurialism. Although student entrepreneurs are few in number,<sup>27</sup> their stories are much told. The university even offers financial support and legal advice for student startups (in exchange for a small amount of equity).
- The University of British Columbia and the University of Washington, two large, multivalent universities, presented a more traditional orientation -- but with a great deal of variation among programs. Arts programs, in particular tend to resist a “training” orientation, even though businesses are very interested in arts degrees as a general qualification. Departmental rivalries were cited by one University of British Columbia administrator as a crumbling but still significant barrier to interdisciplinary linkages that can make education more relevant to business.

For the student, the appropriateness of the training is only part of the story. The university itself is part of the student’s credential. The education embodied in the student must not only be good, but must be seen to be good.

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<sup>26</sup> The first sentence on the first page of the Heriot-Watt web site boasts that a degree is a “passport to employment” with 70 per cent of graduates employed within six months of their degree. The university has put “student placement” on an equal footing with “research partnerships” as its goal for industry interactions, and many of our interviewees readily offered facts and figures on graduate employability.

<sup>27</sup> “In a hot job market students are more likely to take a good job than get involved in a start up -- maybe they’ll do a spin-off later,” Carleton professor.

The challenge of visibility is addressed by several mechanisms. Intangible but important is the *reputation*<sup>28</sup> of the university. There is little potential for conflict around reputation, because the interests of students, the university and firms in the region are almost entirely coincident.

Other mechanisms may directly or indirectly serve the student's interest in being noticed. A technology park, which has technology transfer as its direct aim, was cited at the Technical University at Braunschweig as a source of part time work and an immediate home for student-led spin-offs. In regions like the Seattle and Ottawa areas, where demand for knowledge skills in particular specialties like computer science is very high, the universities have a correspondingly high profile.

Arguably, visibility may work too well. A student may quit before graduating to take a high paying job. This seems to operate against the universities' interests in citizenship and civilization. It clearly pleases the student in the short term but the university professionals with whom we discussed the issue generally believe failure to complete hurts the student in the long term.

Students may continue to interact with the university after they graduate and become employed. Such interactions are generally seen as beneficial in strengthening the university-industry relationship and, for that matter, improving the quality of education/training. Student-led spin-off companies tend to interact strongly with their former institutions, and students know how to work the levers to the best benefit for their firms. In some faculties, former students are invited back as guest lecturers. Alumni associations are a traditional network. More systematic follow-up and contact would help the university get broader feedback from alumni.<sup>29</sup> The movements of masters and doctoral graduates at Washington and the University of British Columbia are tracked, but the main use of the data is to compile statistics on salaries and employment rates. Alumni offices usually have good lists, because long-term tracking is important for fund-raising.

Under the heading of regular employment, we would also include work for *consulting companies* or other companies where a faculty member has a substantial interest. This form of employment creates additional conflict when a member of the faculty is a principle of the consulting company, especially if the faculty member is also the student's supervisor. Some universities, like Waterloo, take the trouble to underline that such work must be undertaken with the student's free consent. Issues around consulting are discussed further in section 6. The University of British Columbia defines as "exploitation" of a student, and to be avoided, student employment by a faculty-owned company, unless the following conditions are in place:

- the student is under no obligation to engage in such work;
- the student's performance in such work has no bearing on academic standing;

<sup>28</sup> "It is the quality of the research (at the university) that gets them jobs," University of British Columbia professor.

<sup>29</sup> The University of Washington does an exit survey, and has made attempts at 5-year and 10-year followup.

- the student is reimbursed at market value for the work performed and/or receives other significant benefit, e.g. the work is relevant to the student's academic/professional training.

In practice, it may be difficult to enforce these conditions, particularly the first, as a student may feel heavy psychological pressure to accept work with a professor's consulting arm.

### 5.3 *On campus research*

Students, including undergraduate students but more commonly graduate students, often participate in research projects that serve the interest of a private company, usually as paid research assistants, often as part of their own research agenda in support of an advanced degree. There are many possibilities for conflict in these relationships (Slaughter, 2002). The student has interests as a learner, as a discoverer, and as an employee. The firm has interests in discovery and as an indirect employer, through its contract with the university. As the products of university laboratories become more directly relevant to the market success of firms, the conflicts increase because the stakes increase for all parties.

Every university we studied has developed policies around the management of intellectual property arising from research activities by professors, in particular the division of income from IP among a firm (a firm which may not exist at the time the research is performed), researchers, and the university.

The first issue is *confidentiality*. Companies have a reflexive and entirely reasonable tendency to keep confidential any information that could benefit a competitor, while the university ideal is ostensibly to disseminate openly the knowledge it generates (Tasker and Packham, 1994; Bok, 2003). However, as researchers become better at generating knowledge that is not only academically interesting but also commercially relevant, the institution may come to value confidentiality more strongly. The most important concern for the student is freedom to publish the results of research projects.

It is rare that *any* original research result worthy of publication in a referred journal can be kept confidential indefinitely, although delays are often permitted. Sometimes, the delay is quite short, e.g. 30 days at the University of Washington and 60 days for patent filing, with occasional exceptions up to six months. Six months to a year was cited frequently as a reasonable publication delay to protect a company's interest. Usually, there is room for negotiation. The moment for negotiation, it is agreed, is before the research contract is written.

Where students are concerned, the rules are tighter. Very little delay would be tolerated if the information were required for a thesis (University of Waterloo). To reduce the pressure on students, the University of Washington discourages students from having access to confidential data and graduate students would not be allowed to participate in proprietary research. Nor would graduate students be allowed to participate in research

classified for reasons of national security (such research being rare in any case and requiring approval at the highest level).

Scientific disclosure and review is a rapidly changing area, with practices and expectations varying strongly from one place to another. Being central to the academic enterprise, serious conflicts are likely and continuing effort will be needed to address them.

A more subtle conflict is that between *commercial relevance* and *academic relevance* of industry-related research, especially when the research is industry-funded. The issue is related to the issue of education vs. training discussed in the previous section. The conflict is long-standing and well-canvassed. Responsibility for resolving it is left in most cases up to the individual professor.

The practical policies that emerge at the micro level can appear quite different. For example, at Carleton University, we spoke to one professor who never uses students on industry projects, preferring them to work closer to the knowledge frontier; another, at the same institution, said his primary motive for accepting industry contracts is to get students involved in industry projects. A third said, “The thesis needs to supply an intellectual challenge, but the students like working with industry and I've never found it hard to reconcile; I've never had the problem that the company just wants us to do consulting.”

What these contrasting practices have in common is a keen interest in the relevance of research to the student's interest in education. The appropriateness of each practice can be evaluated only in the context of the professor's particular research interests, e.g. the degree to which they are basic or applied, risky vs. safe, long term vs. short term, and the particular regional and industrial context.

Even at the University of Washington, the pattern of individual responsibility at the professorial level appears to operate, despite that university's tendency to centralized rule-based systems. Nevertheless, an industry relations office sees as one of its functions to buffer students from possible conflicts, for example if a student stipend is paid by a corporate grant then the payment might be placed in the hands of the department chair rather than the professor. The office has the power to establish an “oversight” committee that the student can appeal to – although this has never happened. The general attitude seems to be a consistent and conservative one of defence to the student's interest.<sup>30</sup>

If the balance between academic relevance and commercial relevance appears to have been well thought out, it is not quite as clear that the same is true for the balance between “career relevance” and commercial relevance of on-campus research projects. There is a presumption that if research is commercially relevant, then it will automatically advance a student's career prospects. This is probably true with respect to the participating

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<sup>30</sup> “Contract research is hard to reconcile with the long term interests of students,” Washington central administrator. “We have had to clamp down when people's research schedules were driving their (teaching) calendar,” Washington faculty administrator.

company, but may not be true for competing or unrelated companies. On-campus research may provide greater or smaller career benefits to the student, depending on the opportunities the student has to interact with and be noticed by the company.

A more serious area of conflict, especially given the increasing monetary values being attached to intellectual property emerging from university laboratories, is the protection of students' financial interests.

Traditional arrangements are under pressure. In Germany, until 2003 when the law was changed to vest ownership with the institution, inventions were generally shared among the professor, the research assistant (most senior students have positions as research assistants) and the client firm. In institutes with a single professor and many senior researchers with years of experience, research assistants can be quite independent. In some cases students are now pushing for the right to sign contracts directly with a firm, to retain intellectual property ownership and still get academic credit for their work.

At Carleton, graduate student interests are explicitly protected in contractual arrangements made before the research starts. Sometimes novel arrangements are made, for example the student interests may be put into a pool to be shared by all the students involved over the course of the project. Some projects are quite complex, involving students from different faculties, e.g. business and engineering. In its written policy, protection of students is the first-listed priority for research contracts.<sup>31</sup>

Heriot-Watt has published a particularly clear set of guidelines for the day-to-day management and protection of intellectual property in situations students are likely to encounter when participating in sponsored research or through part-time and co-operative employment.<sup>32</sup>

The University of Washington Medical School considers that in research relationships there are two "vulnerable parties," namely patients and students, where the university has a special responsibility. The university continues to wrestle with problems presented by increased entrepreneurial activity by university researchers; when we visited, research administrators were working on a model for managing spin-off companies to protect student interests.<sup>33</sup>

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<sup>31</sup> Carleton's formal policies for student involvement in Research are summarized in Section VII of the Handbook of Research Policies and Procedures, which is both comprehensive and straightforward. The student section covers: health and safety, academic considerations (attempting to separate paid work and research training, thesis work and work in support of the professor's research program), secrecy (no secret work permitted for students, maximum delay thesis publication delay (up to a surprisingly long two years but any delay to be approved by the graduate studies dean), proprietary research (not permitted on campus), and student responsibilities (to protect the reputation of the university).

<sup>32</sup> Technology and Research Services to Staff and Students, IP Basics:  
<http://www.trs.hw.ac.uk/terry/internal/protect.htm>

<sup>33</sup> The current policy provided that in situations where a professor is a board member or receives an equity interest in return for the use of his or her services and/or inventions in a business venture, high level approval is required to protect the interests of graduate students and head off other conflicts.

#### 5.4 *Off-campus research*

Much of the preceding section regarding on-campus research activities applies also to off-campus research. However there are some additional issues and some differences in the potential seriousness of the conflicts flowing from the off-campus context.

Working on the premises of a company, the student is much more subject to the culture of the company. That would be an advantage from the point of view of building confidence that could lead to future employment and for growing understanding of how the private sector operates. It can be a disadvantage from the perspective of academic *integrity*. The student is more likely to have access to confidential information and more likely to sympathize with the company's need for *confidentiality*. In extreme cases, the student may feel pressure to proceed with less rigor or even to manipulate data to support commercial ends. Other than expectations of correct behavior, there are few mechanisms to mitigate this additional conflict.<sup>34</sup>

While students working on industry premises are more likely to get noticed by the company for their contributions, they may have less connection with their academic peers. It may be important for the company to formally recognize intellectual contributions.

The student interest in working off campus is principally the industry connections and enhanced job prospects. A Carleton professor emphasized that the resulting *career* job need not be – and often was not – with the participating company; that is, the work confers a generic benefit, consistent with the normal academic orientation. However, the formal Carleton policy toward off-campus research is quite restrictive, evidently reflecting a substantial concern that academic values can be compromised in an off-campus setting.<sup>35</sup> At the Technical University at Braunschweig, students often do one or two major papers and most engineering and applied sciences students do a diploma thesis on concrete industry problems, all of which amounts to a substantial part of the student's *academic* work. The professor decides whether the work will be done partly or wholly on company premises, generally leaning in the direction of the company because it serves both the student's interest in job prospects and the professor's interest in building personal contacts inside the company. The student projects are also seen a principal means for discharging the university's responsibility to transfer knowledge to industry.

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<sup>34</sup> “We don't have specific policies for students, except we do require that grad students not be compromised in commercialized work, e.g. improper data manipulation,” University of Washington administrator. The university is also subject to the new state ethics law, but the main preoccupation at the time of our interviews had been to soften the restrictive impact of a law seen as aimed at “crooked government contractors” rather than industrial research collaborators.

<sup>35</sup> Off-campus work is the same as any other part-time job except where the academic supervisor is connected with the company, in which case the work must be defined in a written agreement approved by the graduate studies dean. If a professor forms a company, the status of every graduate student must be reexamined and students have the option to switch supervisors.

The Technical University at Braunschweig model of industry-based projects as a routine part of academic training is still unusual in the other universities, but the other universities were nevertheless able to cite small-scale examples of the approach, while remaining tentative about the implications for control of academic objectives.

The conflicts related to career-building are less severe for off-campus research, as the interests of the student and the firm are parallel, and more forward than those of the university. Conversely, potential conflicts related to educational values (while not severe) are greater than on-campus.

### **5.5 Teaching inputs**

Inputs from industry to the teaching process are of two types: on the one hand, advice and/or direction; and on the other hand, direct participation in the teaching process. Both types of interaction are common at the six study universities.

*Advice* is common, and direction is rare. We did not find a single example where industry has definitive input into curriculum. Uniformly, the universities want to know what industry is thinking but do not want to give up real power to set the academic agenda. However, the mechanisms were quite different.

At the Technical University at Braunschweig, the most cited influence comes not via individual firms but through professional associations such as the Verband Deutscher Elektrotechniker (association of German electrical engineers). These organizations lobby the university institutes, each of which operates under a powerful professor. Indirectly, industry has a great influence through the professors themselves as almost all professors have an industry background. The professors are entrusted with the responsibility of balancing the views of the two worlds, industry and academia, and no doubt they are in good position to do so. In our conversations, there was an implicit understanding that industry's views were important and to be respected, but the institutional structures were such as to keep industry somewhat at arm's length.

The counterpart university in Canada, Waterloo, was more diffident about industry advice. There was a clear recognition that industry would *like* to influence curriculum and teaching, but a clear reluctance to be seen to be influenced.<sup>36</sup> Even advisory committees seemed rare: a 36-member advisory group for the co-operative education programs meets twice a year, but discussions are high level and strategic, expanding to broad issues such as research collaboration. For example, the group has pressed for teaching arts to engineers -- but had not yet been successful in persuading the engineering faculty to make more room for non-engineering content. It was acknowledged that industry does have significant influence. While curriculum designers understand the importance of industry-relevant knowledge, they also recognize that the views of industry carry additional weight because industry provides financial support for research and scholarships.

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<sup>36</sup> "They will request a course on this network switch or that software; we won't do that, but we will teach a general course. Below me, the department chairs very much feel this way too," Waterloo dean.

At Heriot Watt and Carleton, advisory boards were frequently used. Ultimately, however, it is the professors who decide, a Heriot Watt professor pointed out. Advisory committees, while common, are not required. As for educational services to industry, an area in which Heriot Watt is particularly strong, there was a clear policy that curriculum material, including distance education, must first improve the service to on-campus students.<sup>37</sup> At Carleton, laboratories have their own advisory boards, which typically meet annually but, again, “we decide how to change our courses”. Professors are alert to the industry state-of-the-art, use their contacts to stay in touch with it, and feed it back to the students. The university does not do company-specific training (although an individual professor might do it as a consulting project).

At the larger universities, the picture is more complex. Perhaps size lends confidence because, overall, there seemed to be less nervousness about acceding to industry priorities.

The University of British Columbia Centre for Advanced Wood Processing was a salient example, working closely with industry on curriculum and offering industry frequent opportunities to participate in program reviews. Research agencies and professional associations participate in curriculum review in the University of British Columbia forestry faculty, but not applied sciences. The arts faculty did not have curriculum advisory boards except in accredited schools, such as librarianship and journalism, but was in the process of setting up fund-raising committees and the administration recognized that this might lead to pressure to adjust curriculum.

At the University of Washington, there is a feeling that industry is important in setting the teaching agenda but the mechanisms are almost all informal, facilitated by the great variety of university-industry interactions set up for other purposes. There are some things industry is interested in and the university is aware of them, e.g. learning outcomes and competency-based approaches. Big firms want on-site programs, especially when company employees are participating as students or lecturers. They are keen that the university teach their particular technologies. However, “we have no fear of loss of control . . . the faculty take which advice they want,” said a senior administrator. There are some advisory committees and they are listened to, but evaluation of programs is strictly an academic exercise. There are some high level worries about industry “reaching in” to the university with a bag of money and a wish list. While money is a scarce resource and welcome, accepting it can be costly in human resources, because a new program may divert faculty energies. Most problems seem to be resolved through a process of listening and negotiation: for example, a perceived need for off-campus instruction might be resolved by using teleconferencing and having the student to the site once a week.

There is general unwillingness to teach *firm-specific content* as opposed to industry-specific content. While this reluctance is easy to understand from an academic

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<sup>37</sup> This was the policy of the current chief executive, and stood in contrast to that of his predecessor, who had greatly expanded the distance education program with a clearly stated agenda of building services to industry, not just in the region but internationally.

perspective, it may not always serve the student's interest, for example, if the firm is a major local employer. However, the general view remains that students benefit from more generic content because it gives them more choice. The principle appears to be strongly held, as it very often goes against the expressed interests of companies.

The most common model for *participation* in the teaching process is to appoint unpaid adjunct or affiliate professors and lecturers from industry. The persons appointed continue to work for their companies, adjusting their schedule as needed to fill the teaching responsibilities but, in principle at least, not to the detriment of their full-time job responsibility. There are many possibilities for conflicts affecting students in this kind of relationship. What are the qualifications of the teachers and the quality of the teaching? Will pressure from the regular job shortchange the teaching activity? Will content be too idiosyncratic or company-specific? In practice, there seem to be relatively few impacts, and relatively little expressed concern about conflicting interests.

In the first place, industry teachers are self-selected for enjoyment of and commitment to teaching. The appointments carry a fair level of prestige, in which the company too may bask. As a result, visiting teachers usually try hard and get good results. Professors and departments feel they have good control over content. Companies get an intimate look at the best students, which helps them in hiring; this company interest matches the student interest in exposing his or her talents.<sup>38</sup>

Industry-based professors are inexpensive<sup>39</sup> for the universities, which could result in over-consumption: The "best" volunteers are used up, the university engages the second best, and quality drops. To the contrary, up to now the substitution brings in cheap experts with teaching skills that match or at times exceed those whom they are replacing and supplementing. However, the trend is in its early stages.

At Heriot-Watt, the mechanical and engineering departments had been recruiting visiting professors for four years. The visitors teach and do research. They are members of the departmental staff committee and also serve on advisory committees. They constitute useful connections for students, who are expected to spend a year in industry before they graduate. Carleton adjunct professors may do little teaching but often supervise graduate students. Final year "applications" courses in computer engineering are taught exclusively by guest lecturers from industry.

The two large universities take a more deliberate approach to industry teachers. At the University of British Columbia, adjuncts need qualifications similar to candidates for regular employment at the assistant professor level, which usually means a PhD. Some are paid, and some work for free, but may be rewarded with a special title such as "executive-in-residence." They are seen as particularly useful in courses involving case studies or professional practice. At the University of Washington, so-called affiliate faculty, people whose principal work is not at the university, are individually voted by the department and approved by the graduate school. They can then become faculty

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<sup>38</sup> "This is much more effective than the co-op process," owner of high technology spin-off

<sup>39</sup> "We use a lot of sessionals from high tech firms -- they are a bargain," senior administrator, Carleton.

members, chair PhD committees and supervise students. However, relationships with industry can also be very informal. An engineering professor said that when a company calls him with a technology problem, he often responds by inviting them to come out and tell it to his class.

Non-credit courses at the University of British Columbia are taught by consultants paid at market rates; at the University of Washington, similar courses are taught by practitioners who are paid a relatively low rate (a few thousand dollars per course). Practitioners perceive non-monetary benefits, namely codification of their knowledge and prestige.

At Waterloo and the Technical University at Braunschweig, outside teachers are less used.<sup>40</sup> At the Technical University at Braunschweig, a compensating factor is the fact that most of the regular professors have had previous careers in industry and diligently maintain their industry connections.

## 5.6 Sponsorship

We identify three forms of corporate sponsorship that impact on the interests of students: *gifts of buildings and equipment*, *student financial support* in the form of named scholarships and prizes, and payments to the university in exchange for exclusive *marketing rights*, e.g. banking services or fast food products.

The firms' interests are substantive and clear: Donation of buildings with the donor name attached is a recognized means of franchise building for the company, enhancing the corporate reputation by associating it with the university. Marketing arrangements build brand loyalty. Scholarships show commitment to the future of the community and, secondarily, build good will with the university's best students. None of these pose much of a threat to student interests, although students may approve or disapprove these arrangements on the basis of what they perceive to be the public interest (Moses, 2000).<sup>41</sup>

Donation of *equipment* is widely viewed to be a riskier area for students. The risk is that the student's skills and experience will be slanted to the products of a particular company. We encountered little in the way of policy to deal with this conflict. In many cases, professors and students were grateful to have some equipment where otherwise they would have none, or only outdated equipment. Sometimes there was a *de facto* tit for tat, for example in a relationship described by a Carleton professor, a corporation would provide copies of new software products to familiarize students with their use, a student might then write a paper describing a new application of a product, and the company would cite the paper in their advertising. Equipment donations, while

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<sup>40</sup> "We try to keep most of our classes taught by regular people," "We are very rigid, we have very tight control over curriculum and exams," Waterloo administrators

<sup>41</sup> Product endorsements at the University of Washington have been vetted by committees representing campus interests, including students. The student presence was opposed by some faculty.

important, are often small scale in the context of the whole university, and so it falls to departments and individual professors to make judgments about what is appropriate.

Often, there is room for negotiation between the university administration and faculty over the form of a corporate contribution. Scholarships and prizes are a preferred form, in part because they do not involve a technology commitment. Government policy in Canada supports this approach, by counting scholarships as a “matching contribution” from industry where such contributions are required by granting programs.

## 6 Conflicts affecting faculty

*“No employee shall have an interest, financial or otherwise, direct or indirect, that is in conflict with the proper discharge of his or her official duties,” University of Washington Handbook, Employee Responsibilities.*

Members of university faculties are, by and large, the persons most involved in mediating university-industry interactions: shaping research linkages, designing and delivering education services, and connecting graduates with employers. As participants in these interactions, faculty enjoy personal benefits or tolerate personal difficulties. Gains and losses in *money, prestige and influence* have to be balanced against obligations to the university as a whole, its clients, the private sector and the general public. Expectations are high for this intellectual elite. Regarded as wise and experienced, positioned at the heart of the university enterprise, granted social privilege based on a thousand years of tradition, professors are at the same time powerful and exposed.

### 6.1 Qualifications and experience

Who gets to be a professor? There are two issues for us: the role of industry in defining the qualifications for who should be a professor, and the role of industry in qualifying people to become professors. The first issue revolves around industry input into the standards for hiring or even into specific hiring decisions. The second, around the value attributed by the university to knowledge and experience gained by working for industry. If the value is low, then potential candidates would be wiser not to dally in an industry setting.

*Connections to industry* are viewed somewhat equivocally. Is it a help or a hindrance to a person contemplating a university career to have spent some time, or even a great deal of time, working in industry? For all fields of engineering at Technical University of Braunschweig, the answer is clear: the normal route to a professorship starts with a substantial career in industry.<sup>42</sup> The successful candidate will normally have a senior management job in research and development. The only problem the Technical University at Braunschweig perceives with this model is that more and more there is a salary gap, and even something of a prestige gap, that is making it harder to entice corporate stars to lead the research institutes.

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<sup>42</sup> In engineering, professors are expected to have at least 5 years of industrial experience.

At the other five universities in our study, the answer is not clear at all, even in the fields of study most closely linked to commercial possibilities. In our interviews, we often heard conflicting views even within the same department. An ability to understand and work with industry partners is commonly viewed as an asset -- but not the most important asset. Industry experience is viewed as a way to create that asset -- but not the only way. Quality of research is generally cited as the most important qualification, a credential that can be hard to demonstrate outside an academic context. "Industry contacts" and "teaching ability" compete, distantly, for second place. Teaching skills are hard to demonstrate from an industry base. Universities also prefer candidates who already have research funding that will move with them.

At Carleton and Waterloo and Washington, we were told that many or most new hires are younger PhDs without, therefore, much chance to accumulate industry experience. There is recognition at both these institutions that industry experience is not to be sneezed at and indeed should be sniffed appreciatively. However it is not, yet, a clear benefit.<sup>43</sup> Candidates may be asked about industry experience, but it is not required. At Carleton, many candidates now present with industry experience. At both Carleton and Waterloo, a keen *interest in industry collaboration* would seem to be enough. If there is some ambiguity at the entry level, the priorities are clearer when hiring or promoting to a tenured position: "In the tenure decision, industry experience is not important, it's the research record," said a Waterloo dean.

At Heriot Watt, we were told that engineering professors who have come from industry R and D departments have worked out well (but not shop-floor or administrative engineers). In the next breath, however, we were reminded that teaching is now being given drastically more emphasis, which works against people with industry backgrounds.

At the Technical University at Braunschweig, the industry preference is strong for engineering professors, but less so for others. Hiring in sciences is usually from universities, not industry. Researchers who are not professors are normally academics. Typically they are working on PhDs and teaching. They are not permanent employees: only professors have permanent appointments.

Accreditation standards play a role in encouraging industry experience. For example, engineering faculties in Canada are supposed to maintain more than 50 per of faculty with a Professional Engineer designation, which is easier to find in an industrial setting.

Industry is mostly a passive source of talent and rarely plays any kind of direct role in faculty *selection*, which is normally done at the departmental level with approval of a dean. However, there may be exceptions in high profile cases. A company participating in a major new laboratory or project may have more interest in some professors others; indeed such major projects are often built around a single academic star along with their existing academic associates and industrial collaborators. Further, a dean might quietly

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<sup>43</sup> There appears to be a conflict between the message from administration (applied, applied, applied) and the traditions of academia (research quality, scholarly, publications). The conflict will take some time to resolve, in part because of the hands-off administrative style.

review an important selection with key regents or governors, among whom may be persons from industry.

## **6.2 Outside interests: ownership, investment and employment**

Professors may have outside business interests related to their areas of scholarship.<sup>44</sup> In the past, consulting, which will be treated in the next session, drew most of the attention. More salient in recent years are business interests related to transfer of new technology into the private marketplace, which may involve professors acting as founders or investors, employed as scientists or executives, or serving as directors of spin-off companies. Professors also act as suppliers to arms-length firms of scientific services, expert opinion, human resources (students and graduates) and academic contacts. Additionally, professors may be employed by unrelated companies during sabbaticals and leaves of absence or be recruited for permanent employment. These trends have paralleled growing acceptance of the university's role in community economic development and in the training of graduates who can move easily into a private sector environment. Material interests by professors in outside companies are common. One estimate at the Technical University at Braunschweig is that 75 per cent of professors in engineering and other applied sciences have active material interests in firms. The interests are recognized as powerful ones and every university has policies and practices that address the inevitable conflicts.

Because the nature and circumstances of outside interests are so variable, the most common requirement is a duty to disclose interests in outside companies, with the remedy established on a case by case basis.

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<sup>44</sup> We are not interested in business interests, investments and work *unrelated* to a faculty member's scholarly expertise. Yes, there are possible conflicts, but they are not peculiar to the university environment.

### ***Some Examples***

*The University of British Columbia (UBC) Policy Manual gives some concrete examples of outside interests (Share position, Directorship, Managerial position whether paid or unpaid, Consulting relationship) and possible conflicts:*

- *A company in financial difficulty owes UBC money for a cooperative research program; a UBC employee with a significant interest in the company could take part in a decision to pay creditors other than UBC.*
- *A UBC graduate student supervised by a UBC faculty member who has a significant interest in a company works on a project of interest to the company and is asked to assign his or her intellectual property to the company without disclosure to UBC.*
- *A UBC faculty member has a significant interest in a company and through the activity utilizes intellectual property to which students, UBC staff or other faculty members have made substantial contributions without recognition or compensation to the other individuals.*
- *Supervising faculty or staff members use University students or staff on University time to carry out work on behalf of a company in which they have a significant interest.*
- *University resources, space or facilities are used by a faculty or staff member to benefit a private concern in which the individual has a significant interest.*
- *Charges for use of the University's specialized laboratories or equipment which are differential for outsider organizations may lead to allegations of favoritism.*

*Spin-off* firms offer the most complicated challenges, in part because the ground is shifting so quickly. Spin-off firms have always existed, but the rate of formation has greatly increased, the rate of growth and potential for early income has expanded, and public fascination with the phenomenon has deepened. Universities have a strong interest in fertilizing the activity, because it can bring in money and a certain kind of prestige, and they have a balancing interest in preserving the ideals of academic inquiry and another kind of prestige, not based on commercial success. (Krimsky, 2003)

From the point of view of the spun off company, it is beneficial if the professor who invented the technology remains involved either as a co-owner or significant investor. To the extent that the company does well, the university does well. So spin-off activity is mostly encouraged, never discouraged. At Carleton University, for example, the faculty collective agreement (union contract) facilitates leave for professors to set up spin-off companies. Arrangements tend to be individual; the numbers are still small enough to admit a case-by-case approach. According to a University of British Columbia

administrator, “anything is possible . . . but nothing is automatic.”<sup>45</sup> At Heriot Watt, the founder of a company that uses university-developed technology in the oil industry continued to teach at the university, and also received government funding to support a two-year secondment to the company, but this was considered unusual. At Waterloo, spin-offs are encouraged and, because professors own the intellectual profit they create, may not always be formally disclosed. The university has a written policy and a standard contract for dealing with professors through their spin-off companies.<sup>46</sup>

At the University of Washington, spinning off companies is an honored activity but the university has many formal rules for managing financial conflict (see the following sections on Research activities). It is considered best to take leave or resign. “If you go to a startup, you should go full time, especially if you have a financial stake,” said one administrator. A central issue is management control, e.g. a professor may work part-time at the firm, provided it is as a scientist and not as a line officer.<sup>47</sup> Similarly, at the Technical University at Braunschweig, a professor may own a spin-off company but cannot operate it. The University of Washington has strict intellectual property rules: professors must disclose any IP they create, even when it is owned by the company they are working for. Company founders are also bound by the conflict of interest rules for consulting (see following section).

*Sabbaticals* are a traditional method for professors to rejuvenate themselves. Industry-based sabbaticals were said to be common at the Technical University at Braunschweig and Carleton. Waterloo engineers are encouraged to “include industry” in sabbatical plans. Industry sabbaticals lack flexibility for the professor (requirements re timing, academic relevance) and the university (restrictions on backfilling) and *leaves of absence* may offer more flexibility. Carleton prefers leave, backfills the position, and does not expect that the professor will come back . . . but *does* expect great benefits from students going back and forth and from the network that will be established between the company and the professor’s university colleagues. At the University of Washington, professors can get a leave without pay for up to two years, in addition to paid sabbaticals. However, academic expectations remain a barrier to leave arrangements for younger professors, because the leave breaks the stream of publications, said a University of British Columbia administrator. Moreover, the professor’s department may be opposed because (at the University of British Columbia) it cannot backfill for more than one year.

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<sup>45</sup> An example of the delicate balancing needed is the University of British Columbia policy on licensing of intellectual property, which deals explicitly with faculty interest in a spin-off: “In making these (licensing) decisions, the issue of personal gain of the researcher must be addressed. This requires the complete disclosure on the part of the researcher about involvement with companies under consideration, as the royalties awarded through the license will be adjusted to take into consideration any company holdings of the researcher,” Policy #97, University of British Columbia Policies.

<sup>46</sup> University of Waterloo Policies, Policy #52, Private Corporations

<sup>47</sup> The written policy (University of Washington Handbook, Vol. 4, Part V, Chapter 7) specifies there be no direct managerial involvement of the faculty member in the business venture, there must be an arms-length relationship between the faculty member's responsibilities to the business venture and the faculty member's academic responsibilities, and mechanisms must be in place to ensure that the research program of the faculty member is not distorted by his or her interests in the business venture.

With respect to flexibility to take temporary employment, professors at the Technical University at Braunschweig are more limited in some ways than their counterparts at the other study universities, despite their close connections with industry. They are employees of the state, and civil service regulations make it difficult to set up long term leaves. (Part-time teachers have more flexibility.) Also, it is difficult for university professors to move back into *permanent employment* in the private sector if they have been working in a university setting for too long, which translates to anything much more than five years. This is the inverse of North America, where it is easier to go in the other direction, from university to industry. One way of maintaining an ongoing linkage at the Technical University at Braunschweig is a joint university-industry appointment, which exists in three Technical University at Braunschweig institutes.

Sitting on a *board of directors* is a situation where a professor has a great deal of control of a company, as well as a fiduciary responsibility to act for the benefit of all shareholders. Sitting on a board can be beneficial and educational, said a University of British Columbia administrator, but it always creates conflicts. Professors “do sit on boards, but we wouldn’t know about it,” said one dean.<sup>48</sup> The university policy handbook has guidelines on board participation. In the German context, board membership was seen as an important lever to steer business to the university. We were told of a corporation that had a strong relationship with a Technical University at Braunschweig institute because the professor was also the company director responsible for R and D. The university certainly benefited; the company’s shareholders, not so certainly. When the professor left the board of directors, the relationship with the university became very weak. The more senior the professor, the greater the potential for conflict. (Desruisseaux, 1999). University presidents are often invited to sit on boards of important corporations, often accept, and always face serious conflicts or perceptions of conflict. (Wasser, 2003).

The more involvement, the more likelihood of conflict. We found one example at the University of Washington of a professor who was a founder, sat on the board, acted as a consultant and continued as a full-time academic. This was an acknowledged exception to university policy.

### **6.3 Consulting**

Consulting can be defined as “implementation of standard practice,” that is to say relatively routine, paid scientific services that draw on the faculty member’s professional expertise. The line between consulting and research is important, but not always clear. For example, much that passes as economics research is really consulting in the view of one University of British Columbia administrator. The distinction is important because research by definition involves the creation of intellectual property, in which universities are more and more vigorously claiming an interest. Consulting has been around for a long time, and while the conflicts it provokes are serious (Jones and Louis, 2002), they are well understood, and most universities have consulting policies in place. This does

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<sup>48</sup> However, University of British Columbia Policy #97 requires faculty to “consult” with department head or dean prior to accepting a board appointment. “Approval” is not required, and so it is no surprise that the rule is not a front-of-mind priority.

not mean that all members of the academic community, nor the wider public, believe that current practices are ideal,<sup>49</sup> but there is acceptance that a reasonable balance has been achieved.

The main conflict is *displacement of time and effort* that would otherwise go to teaching and research. The ordinary way of addressing this conflict is to limit the time a faculty member can spend on consulting. There is a strong consensus on how much time this should be: one day a week, or 20 per cent of the professor's time. The rule is normally enforced through reporting procedures; we did not encounter any monitoring or auditing mechanisms. Beyond the 20 per cent rule, which exists in one form or another for all six study universities, consulting policies vary. Exceptions may sometimes be approved. In some cases, other conflicts than faculty time are addressed, e.g. use of university resources, employment of students, and nature of the professor's financial interest in the consulting firm.<sup>50</sup>

The University of Washington has the tightest and most elaborated policies. Faculty must seek approval ahead of time for each consulting project, and the forms need approval by the chair, the dean and the provost. A committee reviews consulting activity for financial conflicts. The university records who is consulting for whom, and the nature of the professor's *financial interest*, for example whether it involves equity in the client firm. If a professor fails to disclose, the professor is on his/her own if anything goes wrong, for example a lawsuit for injury to a patient. Legal liabilities of this kind can be very large in the American system. Professors must also report, after the fact, on what consulting they actually did during the year. Consulting is often a starting point that leads to a research agreement with the university, but there is a strong rule against having both a consulting and a research agreement with the same company at the same time. Intellectual property is not an issue because at the University of Washington, consulting is formally defined as "implementation of standard practice." There are no quantitative controls on how much income a professor derives from or how large a financial interest a professor has in a company.

Use of *university facilities* can be a touchy issue. Public controversy in the 1970s led to the current policy that the University of British Columbia should be "fully reimbursed" for the use of facilities directly by or on behalf of a company. The same rule applies at the University of Waterloo for the use of university equipment. Consulting can't be counted in the University of British Columbia "year-end review" which determines things like merit-based salary increments. The University of Washington policy prohibits

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<sup>49</sup> "I sit on a big committee and half don't believe faculty should get *any* monetary gain," University of Washington professor, but also "(consulting is) a wonderful way for professors to get their hands on practical problems; it feeds back to the classroom and into research," University of British Columbia administrator.

<sup>50</sup> The University of British Columbia policy #97 also mentions a number of intangibles: "The distraction of non-University occupations, the expenditure of emotional energies, the obligations contingent on accepting external fees and salaries may all interfere in the proper discharge of the primary University duties." Also, solicitation of clients on campus is to be avoided. These issues were, however, not raised by any of our interviewees and in practice may be left to the ethical antennae of individual professors.

not only the use of university facilities, but also the use of an office, letterhead, phone number or email address, except in the context of a college or institute practice plan.<sup>51</sup>

The University of Waterloo cultivates an “entrepreneurial climate,” and even to the point where consulting is seen as an asset for promotion and tenure (although it is not encouraged if it is “too routine”). One administrator estimated that 50 per cent of Waterloo professors do some consulting, including the Arts faculty. A university policy<sup>52</sup> on “extra-university activities” identifies five benefits to the university: interaction with the non-university world, student placement, discovery of research topics, skill acquisition, application of knowledge. Consulting activities must be disclosed.

The rules are administered with varying degrees of *flexibility*. Waterloo is flexible on the one-day-a-week rule, said one administrator “if more is required.” At Carleton, where each dean can set consulting policy, there is the usual one-day-a-week limit but it is “not a concern . . . there are no teaching conflicts, because the best (professors) are good at both.” University of British Columbia department heads can approve consulting in excess of 52 days per year.

The most permissive climate is undoubtedly at the Technical University of Braunschweig. Professors are expected to have a private practice, and most do. One professor was said to run a consulting company with 150 employees. Professors decide whether a project is consulting or institute research. One said the decision sometimes depends on how much consulting time the professor has available -- a clear enough conflict of interest but not one that causes much angst. In some cases, a project may be split between consulting and the institute. Consulting firms can use university staff and equipment but are expected to pay. How much, is up to the professor: 15 per cent of the contract is typical. The amount to be paid is an ethical question for the professor, not something that is negotiated or set by policy.

A special category of consulting is delivery of teaching services. At the University of Washington, faculty can supplement their base salary by up to 25 per cent through *extension teaching*. Almost all for-credit extension courses are taught by university faculty. At Carleton, professors sometimes do non-credit professional development on their own time. They are approached regularly by industry, but no statistics are kept. At Waterloo, delivery of continuing education falls under the consulting umbrella. The professor keeps the profits but has to pay for staff, services and facilities.

Clinical trials were also likened to consulting, because there is rarely any novel intellectual property generated. For this reason, the University of Washington does not try to protect it.

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<sup>51</sup> (University of Washington Handbook, Vol. 4, Part V, Chapter 6)

<sup>52</sup> University Policies, Policy 49, [http://www.adm.uwaterloo.ca/infosec/Policies/Policies\\_num.html](http://www.adm.uwaterloo.ca/infosec/Policies/Policies_num.html), updated September 1976.

## 6.4 On campus research

*“Industry contracts are not all good: there are opportunity costs, relationship costs, and the payoff is modest; it's difficult to work with the different culture, for example the firm can be intrusive, and the very short time horizons may leave a graduate students high and dry after a year,”*  
University of Washington administrator.

By far the most complex, studied and controversial arena of industry-university interaction in the last 20 years is industry-funded and industry-focused research led by university faculty and most often carried out in university laboratories. Some aspects of this relationship were discussed in section 5 on conflicts affecting students, while here we are preoccupied with conflicts affecting faculty.

The rapid growth of university-industry  research partnerships has led to large adjustments in expectations of what faculty do, and what they should do (Lee, 1996; Press and Washburn, 2000). There have been major shifts in status within the university as a result. If the pace of change has been rapid, we found some evidence that contract research is plateauing. The growth of industry funding was largely coincident with a contraction in the relative levels of public funding in the 1980s and 1990s, part of a general retrenchment of government expenditure. In recent years, the contraction has eased, in part due to public recognition of the economic importance of the university system, particularly with respect to regional development. At the same time, industry and universities are coming to a better understanding of what they can and cannot do for each other.<sup>53</sup> Consequently, public universities may be entering a period of consolidation around a new balance of private sector funding inputs and influence.<sup>54</sup>

Our study institutions were chosen because they are strongly industry-oriented but, even so, industry money plays a minority role in their overall operations. The Technical University of Braunschweig had at the time of our interviews a budget of 320 million DM, of which only 75 million came in the form of grants or contracts for specific research project. Of the 75 million, only 10 to 15 per cent stemmed from research cooperation with industry. The University of Washington gets about 7 per cent of its funding from industry. That percentage is unlikely to ever rise beyond about 10 per cent, administrators said, because of the difficulties of working with industry: industry interests overlap imperfectly with those of the university and the industry culture remains

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<sup>53</sup> Industry is interested in making new discoveries, as are universities. Industry is also interested in problem solving, in selling equipment, and in keeping in touch with new technologies (it does not always pay to be first). The latter are less interesting to universities. Today's companies, said a University of Washington administrator, are cutting back the amount of research they are doing through the university (the comment preceded the high technology recession that began at the end of the year 2000.)

<sup>54</sup> At Carleton university, for example, the university consciously restructured to respond to New Economy opportunities. Engineering leaped forward and the natural sciences staggered, losing both faculty and support positions. Science disciplines had thrived when Canada pursued a postwar policy of funding new science institutions, particularly in the Ottawa region, but the same departments were at a disadvantage under the new model of encouraging private sector funding and performance of R and D. They remain more dependent on government contracts than on industry contracts.

quite distinct. Bridging these gaps is a variety of policies and practices designed to reconcile the interests of both sides, but the gaps remain.

We begin this section by reviewing some of what we learned about the public and institutional environment that shapes those policies and practices, and then proceed to the some specific conflicts affecting faculty interests.

#### 6.4.1 Public policy

A central notion is the idea of *strategic research*. Policy makers able to influence the university system form views as to the kinds of research that the university should undertake. The views can be general (pure vs. applied, or traditional vs. interdisciplinary) or quite specific: say, an interdisciplinary specialization in nanotechnology. The views are influential: an important institutional policy at Heriot Watt University was to attract national research centers -- the policy features in the narrative of Heriot Watt's International Centre for Brewing and Distilling. Strategic research creates opportunities for some, and dims hopes for others.

Our respondents at the University of Washington believed that the general public expects the university to be useful to the business community. The university restricts the work of being useful only through a very general bow towards educational priorities.<sup>55</sup> Equally, the public expects businesses that benefit from university research to return a *fair share* of the benefits to the university. In addition, unsurprising in a nation of open political processes, there is a high sensitivity to ethical behavior. Finally, the pressure to commercialize coming from federal law is matched by pressure at the state level to emphasize the teaching function. Result: complicated formal processes, with management art exercised to maintain room to maneuver. Each research agreement creates significant management costs – as a measure of the cost per project, consider the comment re industry collaboration: “for \$10,000 or \$15,000, it’s just not worth it.”

The public good is clearly recognized in the University of Waterloo’s written policy on Contract Research, which dates back to 1976 and cites as its object “to provide a service to society by undertaking work aimed at solving social, business or technical problems.” In our 1999 interviews, this orientation was still evident in the retelling, that the university was founded by a collaboration between business and government, and that this collaboration directly led to the cooperative education model. However, in today’s world, a second goal was even more evident, namely, the benefits to the university of industry funding for the purpose of building strong research programs.

High management costs also bite industry. The costs of setting up and administering research contracts put *small firms* at a disadvantage. In Lower Saxony, it is recognized that small firms (excepting small firms associated with professors) face multiple

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<sup>55</sup>The University of Washington Handbook judiciously states: “Industry supported research is valued by the University when it embraces a proper balance between the University's educational mission and industry's quest for the development of commercial products, processes, and services,” (Vol. 4, Part V, Chapter 7, Patent, Invention and Copyright Policy.)

disadvantages. Smaller firms do not employ people with an academic engineering background, so the firms comprehend poorly how universities define and resolve technical problems. The university says they would like to solve problems for SMEs “but not 10 times over.” The technology transfer office internal to the Technical University at Braunschweig, as at many other universities, is very small and relatively passive – one of their main jobs is to draw up lists of R and D activity “in case someone is interested.” To sidestep some of the problems, the government funders have created “sector programs” to pay for university research on problems that interest many small or medium-sized firms. Also, the government has set up regional development agencies outside the university campuses.

Public *funding policy* has been very important in Canada, driving both research choices and hiring decisions. At Carleton, regional development is recognized as a specific priority. New money will go to research areas that serve regional business development. Senior administrators spend a great deal of time keeping their fingers on the pulse of business. Most respondents credit Carleton with playing a significant role in the development of the region, particularly the development of Nortel, Canada’s largest high technology firm at the time, which sprang from a relationship with two Carleton professors. At the University of Washington, the Bayh Dole Act, which obliges the university to commercialize whatever is commercializable, is generally agreed to have transformed the way the university manages intellectual property. (Atlantic, 2000) Since the early 1990s, every newly hired professor has had to agree that the university will have title to all intellectual property. The University of Waterloo, among our examples, is at the opposite extreme, with 100 per cent creator ownership of intellectual property, in principle. But that principle, a Waterloo professor told us, is under threat because the Canadian granting councils are pressing to tap commercial profits to support the university, closer to the American model. Finally, practice differs from principle. In practice, deals are made and even at Waterloo, the outcome is typically a 50-50 sharing of benefits between the university and the inventor.

In the United Kingdom, the national government has established a program of research evaluation, which determines how much public research money flows to university departments. The Research Evaluation Exercise, said a Heriot Watt administrator, is driven by journal publications and rankings among journals. That traditional orientation works against the interdisciplinary work that is of particular importance to industry.

#### 6.4.2 Institutional frameworks

Except at the University of Washington, institutional frameworks are macro rather than micro in focus, and management of the frameworks is delicate rather than aggressive.

At the Technical University of Braunschweig, the independence pole of our sample, the university has very little information on industry money flowing through the institutes, because reporting is not required. There are standard university contracts to be used as models but, in practice, the university has relatively little to do with writing the actual

contract, other than to accept formal liability, via the professor's signature. (The professor, or the professor's institute, carries some liability for follow-on costs.) The professor simply notifies the dean of his intent to sign.

The Canadian universities and Heriot Watt occupy an intermediate space, with rules and approval mechanisms, but operating with an expectation that the administration "not get in the way" of industry research partnerships. A Heriot Watt professor said he negotiates the research contract and then later fills in *pro forma* documents and gets formal permission. Discussion with the contracts office is relaxed. ("I go there and explain why we couldn't get more overhead").

To meet the public expectation for industry partnerships, universities must set the right price in the "market" for such partnerships. From the company perspective, the immediate pricing issue is usually *overhead*, a charge made to cover indirect costs. Concessions have been made. The University of Waterloo, for example, typically charges industry a modest 15 per cent overhead on direct costs for industry contracts, compared to 30 per cent for contracts with the provincial government, and much of the industry research is leveraged with public money. The first priority of the Carleton administration was stated as student interests, followed by overhead and then rights to intellectual property. Overhead for industry at the University of Washington is low (especially compared to the 52 per cent charged on federal research grants) and negotiable, although it was suggested that the markups may grow in future. An increase in price would be consistent with increasing demand accompanied by a satiated willingness of the university to undertake industry projects.<sup>56</sup>

The University of Washington has the most elaborate framework for protecting institutional interests.<sup>57</sup> All proposals come to the center for review of the science, of space, and of conflict of interest. (See Box.) The contract office does administration and budget, the department chair and dean look at academic part of agreement, plus there are special reviews of biomedical and behavioral research. While contracts have to pass many reviews, the details are flexible. For example, most large firms have their own boiler-plate and the agreement is negotiated against that and also against previous contracts and understandings that have been developed with the firm. Once a contract is signed, there is no monitoring, unless a problem arises.

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<sup>56</sup> "We have tons of companies lurking in labs looking for the next breakthrough," University of Washington administrator

<sup>57</sup> "The system is complex, but most (professors) go along, but some would rather just consult," University of Washington administrator.

### *A Conflict of Interest Review Process*

*The University of Washington does a detailed review, summarized below. The process is administered by an official reporting to the vice-provost, Office of Research.*

*The onus for disclosure of a conflict is on the investigator, who must be aware of the university policy. If the investigator believes there is a conflict, it is disclosed in writing to the provost of the university. The conflict executive reviews the letter and discusses with the investigator what should be done to eliminate or manage the conflict in an acceptable way. The discussion, in itself, provides protection fr[redacted] future legal action.<sup>58</sup>*

*The basic question is: Does an investigator (anyone in a position to bias the study) have a motive to behave incorrectly, i.e. a significant financial interest? Once a conflict is disclosed, the study can be structured to minimize the impact, for example by involving another research center or arranging for arms-length data analysis. The approval may be signed off directly, or forwarded to the vice-provost for decision. The process is mostly internal. The company will only be contacted if there is a need, for example to verify that some one has resigned from the board of the company. About 100 cases of conflict are decided in this way each year.*

*The process was still being refined at the time of our interviews. The professional burden on faculty is significant, although less so if the discussion begins while the research methodology is being first defined. The burden on companies can also be large, especially if someone has to resign from a board or otherwise disassociate him- or herself.*

The university has a technology transfer office that assists in more complex negotiations or if the company is demanding inappropriate rights. The office has been important in developing partnership models. For example, software research was mentioned as a difficult area because the company that proposes the research is often the only company that can benefit, so that without back up the professor may get only a modest consulting fee and the university, nothing.

The quotation that introduces this section illustrates institutional ambivalence over industry funding. The current reality is that federal funding is increasing and is likely to be much more stable over the long term than industry funding. “Industry funding, unless you really know what you're doing, should be on the margin.”

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<sup>58</sup> This was the major concession won by the university in negotiations over the state ethics legislation, in effect delegating the state’s authority to the university.

### 6.4.3 Material interests

By material interests, we mean financial or in-kind benefits received by faculty members consequential to a research project undertaken with an industry partner.

Industry funding may support “*professorships*” that sit on top of regular salary. The arrangement is usually solicited by the university. The university benefits because it may otherwise be unable to buy the best scholarship due to budget constraints or union agreements that limit pay differentials. There is the possibility of a conflict, in that the professor may feel an obligation to attend more closely than otherwise to the interests of the industry benefactor. However, to the extent that the top-up in fact succeeds by enabling the university to purchase up-market, the conflict is small. If the professor’s pay, with top-up, is market value, the professor could, presumably obtain the equivalent combination of pay, benefits and lifestyle elsewhere. Universities do have policies on top-up pay. For example, at the University of British Columbia, there is a limit of 1/9 (one month) of income. In addition, industry funding may be used for *course release* (not a cash benefit) and, of course, to support research. The policies may serve as much to limit resentment from less well-paid colleagues as to manage conflict.

Financial interests may come in the way of an equity stake in a firm, or other *contingent arrangements* (which might even include future consulting contracts.) There are not many formal rules covering these arrangements (other than those governing the division of intellectual property). The exception is the University of Washington where a financial interest of \$10,000 or more (or a financial interest of any size for clinical trials) will send the case to a committee that regulates the propriety of consulting projects. The university defines what conflicts apply, rather than leaving it up to faculty to decide what sort of thing might be a conflict. For example, the university believes a conflict can be generated not only if a professor holds an interest in a corporate partner but also if the professor has an interest in one of the partner’s competitors.

A financial interest may injure the university in an indirect way. A Waterloo administrator cited a case where a company got in a dispute with a professor who had been one of its founders, and for a time the university worried that it would be drawn into a nasty dispute.

Sometimes professors receive some or all of their *salaries from “soft money,”* that is from contracts or grants, and there may be a threat to their livelihood when these come up for renewal. The granting institutions in the USA (National Science Foundation, National Institutes of Health) have asked universities to respond to this conflict. The University of Washington has established an Office of Academic Integrity, but very few real-life cases have come up.

As mentioned, outside money can be used to buy out *teaching load*. From a financial perspective this affects neither the university, nor students, since the money can be used to hire additional faculty. However, there is potential conflict because the arrangement may discourage contact outside the classroom with the most talented researchers.

#### 6.4.4 Academic values

*“(The firm) had a set of questions and so we looked to see where our academic interests intersected with their questions”, University of Waterloo professor.*

The potential for impact on academic interests seems high at first sight. From all sides, universities are receiving the message that research relevant to industry is important. Universities have shuffled resources, and whole departments.<sup>59</sup> Matching programs, where a little bit of industry money or even an in-kind contribution can lever a lot of public money, create a strong incentive to slant research priorities to interest the private sector (Tasker and Packham, 1994).<sup>60</sup> At Waterloo, almost 80 per cent of research is conducted in partnership with industry, but income from industry is a fraction of that, amounting in the end to only one per cent of the university’s operational budget.

Despite the temptations of the secular world, or perhaps because of them, we encountered a stubborn defense of academic freedom,<sup>61</sup> seen variously as the privilege of pursuing *curiosity-driven research*, eschewing of the routine for the *novel*, and measurement of achievement by the approval of academic *peers*. As much as there is enthusiasm for industry partnerships, there is also caution and even a distaste for the private sector that has nothing to do with applied scholarship.<sup>62</sup> Whether these attitudes will endure is an open question. Slowly, the faculty makeup is changing as universities hire young faculty with sympathy for, or at least an easy familiarity with, industry-sponsored and industry-focused research. Our impression, however, was that the new generation is absorbing the values of the old. The *culture* of academic integrity is so far intact, and gives rise to both formal and informal policies limiting the intrusion of commercial values.

An administrator at Carleton University, one of the most flexible of the six study institutions, was very clear: in relationships with industry, a line in the sand protects the integrity of academic programs. There has never, he said, been any question of crossing that line. The University of Waterloo provides a sharp incentive. Departments are evaluated on *academic performance* and the research overhead collected by the university is given out accordingly. However, the Carleton administrator suggested that managing the potential conflicts is a matter of education, not direction.<sup>63</sup> Even at the

<sup>59</sup> In a recent restructuring, the business school at Carleton moved from social sciences and became a professional faculty. The change, said a professor, removed some of the traditional research values and showed that the university was interested in promoting industry linkages.

<sup>60</sup> An administrator at the University of Washington said that for National Science Foundation grants, researchers can get by with 10 to 20 per cent matching funds from industry. At the University of Waterloo, a comparable ratio was 20 to 30 per cent.

<sup>61</sup> “We fight all the time for our autonomy. They will request a prof to work on a specific project. We have to say, ‘we’re not in the business of solving short term industry problems,’” University of Waterloo administrator.

<sup>62</sup> Arts faculties still attach more prestige to applied work on government problems than to work applied to industry problems, one arts dean told us.

<sup>63</sup> “We don’t have much of a policy . . . it’s around here somewhere,” said the administrator, looking round his office. We found it at [http://www.gs.carleton.ca/ors/ors\\_policy/](http://www.gs.carleton.ca/ors/ors_policy/), and read in the preamble an explicit

rule-rich University of Washington, it was not necessary to spell things out: “There are guidelines but like a lot of policy it is written rather globally to allow flexibility in interpretation.” Carleton’s openness to cross-disciplinary associations, for example the hiring of a computer scientist into the psychology department, has helped align university possibilities with industrial opportunities.

Here are some issues, in addition to those already mentioned:

- A fear that restrictive arrangements can limit future work.<sup>64</sup>
- Industry funding being too tied to time-limited deliverables.
- The obligation to get to a predetermined endpoint.<sup>65</sup>
- Commitment to equipment supplied by one manufacturer
- Firms more interested in solving a specific problem, or extracting money from a government program,<sup>66</sup> than in establishing a research collaboration

The line in the sand is not aversion to applied research, we were told. One Carleton professor said that his work is so applied it leads mainly to technical reports, rather than academic publications, a problem for him in gaining grants and recognition. But when he described the evolution of his work, it was a search for “fun” that drove him, not practical applications. In other words, curiosity-driven.

If anything, the party at risk is industry, not constituencies in the traditional university community. Some examples that illustrate how traditional interests limit the value to industry of university collaboration:

- Sometimes academics “get the money, do the report, and then disappear” (University of British Columbia administrator)
- Few industry people work in university laboratories due to salary differences and policies of discouragement.<sup>67</sup>
- Ego-massage is used unashamedly, but content may be lacking. “We call them fellows and affiliates, they get brownie points, and we go skiing together.” (University of British Columbia professor)

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recognition of the need for flexibility: “The University recognizes that research flourishes only in an environment that encourages free enquiry, and, since the conditions for good research in our many disciplines are quite different, an attempt has been made to avoid detailed regulations or attempts to cover all eventualities with blanket rules.”

<sup>64</sup> An example cited at the University of Washington involved a company that tried to use ownership of intellectual property to block future research on the underlying technology.

<sup>65</sup> A University of Waterloo professor said he likes applied research but not contract research. He prefers to do the research and then get a company interested in it. For example, when he heard about a problem that a multinational computer manufacturer was having organizing its documentation, he knew that his research could help them. He set up an information booth at a technology fair that was jointly-sponsored by the company and the National Sciences and Engineering Research Council. The effort paid off and he has now a major contract for a research project, jointly funded by the multinational and a local software company.

<sup>66</sup> One Heriot Watt source suggested European Community programs are susceptible to corporate milking.

<sup>67</sup> At the University of Washington, industry scientists are rarely permitted to work on campus, and only under tightly negotiated intellectual property arrangements, because it is seen as intrusive in the academic process

#### 6.4.5 Confidentiality and Publication

The universities we studied were generally sympathetic to company requirements to protect “confidential information,” a well-understood legal concept covering specific information or know-how. University policies permit faculty and students to enter into both specific and blanket confidentiality agreements relating both to the research project and to information that might be obtained incidentally, through contact with company employees for example. Indeed, without this understanding, collaboration with industry would be very difficult. However, publication is a different matter. The outcome of academic endeavor is advancement of knowledge, which implies publication, and so research must produce some publishable material, even if the publication is delayed. This can result in conflict (Mangan, 1999).

Publication in refereed journals has been long accepted as the standard method of evaluating and disseminating research results. Peer reviewed publication remains a necessary condition for academic progress. Likewise, a published dissertation remains a necessary step to launching a scholarly career.

These absolute statements regarding publication and the scholarly enterprise do not need to be qualified.<sup>68</sup> It should be added that there are many other forms of dissemination, some quite effective in addressing other mandates of the university, such as public education or technology transfer. The slow pace of publication through refereed journals led to the practice of circulating pre-prints. Now, the internet has greatly expanded the size and efficiency of networks for sharing pre-prints. There are also electronic versions of some journals and a few all-electronic journals.

All this dissemination exposes companies to the problem of the commons: information that is widely held and generally accessible is not usually as valuable as information privately owned. Companies would like to suppress publication of research they pay for, but appreciate free access to research they do not pay for. The university interest is also divided. For reasons of rivalry and commercial interest both, there is an incentive to restrict publication (Packham, 1992). However, by far the larger incentive is for open and rapid dissemination. In every case we studied, the conflict (potentially a serious one) is resolved by agreeing a modest delay for publication of original results. The negotiation is case by case, and some institutions are more generous than others. Here is a summary. (In some cases, more than one practice is mentioned, reflecting differences at a departmental or even the professor level.)

- University of British Columbia: no publication delay, but an advance presentation is OK; guidelines in the Policy Handbook
- University of Washington: 30-day delay for company review, an additional 60 days for patent filing, occasional exceptions up to six months. Delays longer than 90 days can jeopardize the university’s non-profit tax status.

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<sup>68</sup> At the University of Waterloo, in assessing faculty promotion credit is given only for work in the public domain. The administrator with whom we discussed this point said this strict policy has produced no complaints from faculty.

- Waterloo: agreement to “debrief first and fully” with an industry sponsor.
- Technical University at Braunschweig: a delay of up to one year to give firms time to apply for patents.
- Carleton: one-year publication delay; pre-prints made available to the firm, typically two years ahead of paper publication.
- Heriot Watt: “very little lag” for publication.

Even modest publication delays can be quite useful for companies, particularly for small firms whose competitors rely on published sources. Short delays are less significant for the university and the progress of science generally, because there are so many alternative methods of communicating results to colleagues, including personal contact.

In practice it is personal connection with other researchers that counts more than access to text and tables. Publication opens a door on an ocean of undifferentiated information, while the personal connection establishes interest, trust and obligation. From this perspective, the more important forms of access for industry are briefings and presentations; more powerful still are transfers of human resources, as when a company hires a student who has worked on a joint research project. Informal personal contact is relatively unrestricted, except when it concerns patentable information, in which case premature disclosure can jeopardize ownership.

#### 6.4.6 *Research ethics*

By research ethics in this section we mean the correct treatment in research of human and animal subjects and also the morality of conducting research in subjects where the advancement of knowledge might be judged harmful. The latter idea is controversial. Surely *all* advancement of knowledge is beneficial? The battles of the 1960s over military research and the milder struggles of the 1990s over genetically modified foods show that not everyone agrees.

In general, we would say that ethical controls on the *nature* of research are at a low ebb in the universities we studied. At the Technical University at Braunschweig, there are no controls on the type of research conducted, although there has been some talk of controls on genetics research. There were no constraints reported at Heriot Watt, nor much consciousness of the issue.<sup>69</sup> At the University of British Columbia, the subject of offensive content in software applications has come up, but quietly and only in unofficial discussion.

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<sup>69</sup> “What an interesting question,” exclaimed one professor. On reflection he found it easy to suggest an area that might bear some examination: research on virtual reality created through computer simulation.

At the University of Washington classified or proprietary research has to be approved at a very high level and does not occur in practice, but this policy has more to do with the tradition of open publication than censorship of topic areas. Topics are wide open.<sup>70</sup> Carleton does not permit secret research excepting only that “the University is prepared, in principle, to consider applications for prosecution of secret research concerned with the defense of Canada, and sponsored by Canadian agencies.”<sup>71</sup>

However, controls on the use of *human and animal subjects* are very common, and not just in medical research. Even a gentle and non-intrusive inquiry such as the present one required an ethical approval from the University of British Columbia because our interview subjects were human. The process is not very restrictive<sup>72</sup> and serves to remind researchers that research subjects have rights, such as confidentiality, that are usually more important than the data. For medical research and clinical studies, the rules are pervasive and invasive, but not much in dispute. While occasional clashes between researchers and industry have been reported in the press, we encountered none in our study. The low level of conflict in an area with issues that are both substantial and emotional reflects the legal certainty and social consensus that has been created by the building up of a detailed and prescriptive framework.

Industry does not appear to have any significant role in *managing* research ethics mechanisms. Ethics committees often have some external membership, but this is not necessarily someone from industry -- more often a lawyer or member of the clergy.

## 6.5 Off campus research

Collaborative research projects need not be carried out in university laboratories. Sometimes research can be conducted more efficiently using company facilities. Moving off campus can improve access to specialized equipment, data, company scientists, even to company customers and suppliers. The benefits, costs and conflicts affecting students were discussed in Section 5.4. As noted there, much of the discussion regarding on-campus research applies equally to off-campus research. The discussion here will be limited to *additional* issues that our respondents raised specifically in regard to off-campus research, and to an evaluation of how the *level* of conflict can change when the research moves off campus.

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<sup>70</sup> “Research is undertaken by the University under grants from or contracts with outside agencies, public or private, only when one or both of the following conditions are satisfied:

1. The research involved is in the public interest, and the University's facilities are peculiarly suited to its successful prosecution.

2. The nature of the research problem is such that if University funds were available, the department and/or staff member concerned might undertake the investigation on their own initiative without outside financial assistance.” University of Washington Handbook, Vol. 4, Part II, Chapter 1, an approach which seems aimed mainly at dispelling the image of a “university for hire.”

<sup>71</sup> Section 1, Handbook of Research Policies and Procedures

<sup>72</sup> At the University of Washington for example, our interviews would not have required approval unless they touched on personal and private matters. (University of Washington Handbook, Vol. 4, Part II, Chapter 2)

Aside from the evident logistical difficulties in setting up a research project away from the academic base, the interests of faculty are affected in some fundamental ways. *Secrecy* becomes more of an issue, because the university researchers have more intimate access to company information, through contact with company personnel, documentation, and systems. Faculty may learn information that is outside the scope of the research project, and so outside the scope of intellectual property-sharing agreements. A common solution is for faculty to sign a non-disclosure agreement with the company, protecting information they may pick up in the course of the research. The solution is by no means ideal. Information cannot be segregated perfectly in a human mind,<sup>73</sup> even if the professor is assiduously discrete. And in being assiduous, researchers may well compromise their future ability to pursue certain lines of inquiry or certain forms of collaboration.

A business contact in Lower Saxony told us that companies are seriously concerned about confidentiality, to the point where some would undertake a joint project only in areas the company did not regard as “cutting edge.” In the company’s eyes, a Technical University at Braunschweig professor collaborating on such a project would face an unmanageable conflict.

Another consequence of intimate contact with an industry partner is a *leakage of people*. Part of the research team may wind up being hired away by the company. The outcome can be negative for the faculty, e.g. a professor’s research strategy may be temporarily compromised if a student abandons a degree program. How this is viewed depends on the culture of the institution. At Heriot Watt, where student placement is an acknowledged institutional priority, such an outcome would be viewed as a great success.

Generally, as noted in the previous section, there is a reluctance to have industry scientists working on campus. To the extent that this barrier is effective, an intimate collaboration between a university professor and an industry scientist can only happen off campus.

A special case of off-campus research is that of the professor who has a foot in both camps, for example the founder of a spin-off company who continues to teach and do university based research. The conflict is serious: There is no obvious way to control the leakage of ideas across brain membranes. (In one unusual case, leakage was institutionalized, where the spin-off company had negotiated a right of first refusal on technology developed in the university laboratory.)

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<sup>73</sup> At the University of Waterloo, a professor who does research on corporate business practices said his method is to aggregate his results to create best-practice principles and tools. He then feeds back a custom analysis to each firm, benchmarking where the particular firm stands, but giving little information about its competitors. However, the researchers certainly take away, in their minds, a great deal of sensitive information about company strategies.

## 6.6 Teaching/academic inputs

We had quite a bit to say about industry inputs to teaching in section 5.5 on student impacts. The presence or influence of industry on teaching and academic standards also impacts faculty interests. Some of the impacts go beyond the teaching process, and it is on these that this section will focus.

Visiting teachers, for example, often become involved in other *campus activities*, notably research. At Heriot Watt, the visitors are often senior people from industry, sometimes retired, who carry a certain authority. Often, they bring their own funding for research or draw on their personal wealth. In this respect, they are freer than their regular peers to pursue personal research interests. At the University of British Columbia, an administrator noted that a professor who brings in a notable adjunct gains prestige from his colleagues, as well as gratitude from the administration (that teaching duties are cheaply fulfilled<sup>74</sup>). A Waterloo administrator said support for research and for student scholarships gives industry an indirect but significant influence on academic activities.

There is a potential for conflict if a firm giving advice is also being solicited for *donations*. At the University of Washington, there are two types “visiting committees,” one type dealing with teaching and the other with fund raising.

Industry sometimes intervenes at an *institutional level*. A large company proposed setting up a separate campus using company space in an Ottawa suburb. The proposal was resisted on the basis that returning students from other companies would feel uncomfortable at such a campus. Clearly, establishing a separate campus far from the main downtown site would have many practical impacts on faculty.

In the UK, a consortium of electronics manufacturers commissioned a study to screen all institutions pretending to offer training credentials relevant to electronics manufacturing. However, few if any programs were actually cut out by the process, so the impact was smaller than it might have been. Industry involvement with auditing or measurement is generally regarded with suspicion. The Scottish branch of the UK Quality Assurance Agency, despite its “more applied flavor” has only token industry representation and even that is viewed with suspicion because companies “don’t understand how universities operate.” A Heriot Watt professor, commenting on the influence of industry on advisory committees, said that industry suggestions are sometimes impractical because they are too short term.<sup>75</sup>

Industry representation on boards of governors is fairly common, except in Germany. New German universities are required to have industry representation, but the Technical University at Braunschweig and most other established universities do not have any industry governors, in part, we were told, because the state government would appoint half the industry governors, compromising the university’s independence.

<sup>74</sup> When Carleton was first established, many of the early teachers were sessionals or adjuncts from “downtown”, that is government or industry. The dependence is much smaller today, but the influence on the culture of the university remains unmistakable.

<sup>75</sup> “It’s hard to get them to look even one or two years forward.”

It appears that most of the potential conflicts due to industry involvement in academic affairs are being resolved, on the side of the faculty's traditional interests, by a combination of traditional practices and institutional structures. The industry advantage is that, while the university has to deal with industry, industry does not have to deal with the university. For example, in Washington state, Microsoft has turned to the college system to develop on-site training programs.

### **6.7 Sponsorship**

Traditionally, universities have resisted anything but the most discrete commercial presence on campus, severely restricting advertising, for example, and setting up in-house monopolies (commonly the campus bookstore) to retail necessities of campus life. Resistance is rapidly crumbling, however, due to a combination of financial need, economic opportunity and increasing public acceptance.

By sponsorship, we mean in-kind or cash transfers from industry to university that are, to a first approximation, without cost to the university.<sup>76</sup> Specifically, these include gifts of land, buildings, equipment and other products, of student financial support (discussed under this heading in section 5.6 on impacts on students), of operating contributions in the form of grants or endowments, of event sponsorships and of marketing arrangements. Note: "no significant cost" does not mean "no strings attached" in all cases. The strings may be plain, as in a marketing arrangement where the university agrees that the company will be the sole vendor on campus, or almost invisible as in the gift of a building that merely reminds users of the sponsor's name.

The benefits to the university in these relationships are tangible (Blumenstyk, 2001), the benefits to industry are usually intangible but clearly understood: prestige, brand building, product knowledge and product loyalty. Mostly, firms believe the benefits are at least worth the costs. At times, firms may also see themselves as contributing to the public good, but responsible boards of directors and vigilant shareholders limit the amount of public good that firms will buy.

The costs to the university on the other hand are mostly intangible, debatable and hard to value. Because of this, there is ongoing debate and adjustment to the opportunities offered by industry sponsorship. Most of the costs relate directly to the interests of faculty: distortion of the academic priorities and diminishing of academic independence.

There is the question of *access*. Arts faculties find it harder than engineering faculties to convince firms to contribute.<sup>77</sup> Business faculties are well positioned,<sup>78</sup> philosophy

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<sup>76</sup> It's assumed the transfer has a positive value. As University of Washington administrator reminded us, a noxious gift can have a negative value, e.g. land that carries a liability for pollution cleanup.

<sup>77</sup> "Cultural industries have no money," University of British Columbia administrator

<sup>78</sup> One commerce faculty hired a dean particularly qualified to land what an interviewee called "the big one."

suffers. Sponsorship can change the internal structure of the university, with some disciplines ascendant and others declining. On the other hand, the risk of distorting priorities within disciplines seems greater for those disciplines (or new alignments of disciplines) with the better chances for industry support.

All this is true of other kinds of interaction with industry as well (research funding, teaching inputs, and so on). The “free” inputs of sponsorship are different because more of the value received can be put to discretionary use. The greater the discretion, the less the distortion of the university’s own priorities. As a consequence, conflicts do not at this time seem to be especially severe. Scale is an issue. An administrator at the University of Washington pointed out that much more money still comes from public sources than from private ones. “There are whole departments in medicine that wouldn’t exist without federal funds . . . forestry’s strong environmental slant was driven by public funds.” However, the trend may be upward. A perceived weakening of public sector commitment to universities in the 1990s was coupled with strong growth in the private sector and an increased interest in university affairs.

Contributing to new *buildings* is a longstanding practice, popular with wealthy persons and more recently wealthy corporations. Beyond profile for the donor’s name, the gifts tend to be unrestricted, although they are commonly targeted to a particular faculty. Because the individual gifts are large, they receive careful attention and are often scrutinized against a formal policy,<sup>79</sup> covering both ethical and technical matters.<sup>80</sup>

For a smaller contribution, a firm may be rewarded with the name of a single room. The University of Washington discourages the naming of rooms and prefers that even buildings be named for a person who is or has been important in the university community.

The contributions are significant, but play a small role against the backdrop of total capital spending. Industry gifts pay for 5 to 10 per cent of the capital budget at Carleton, estimated a senior administrator.

Gifts of *equipment* and other products that can be used in the classroom or laboratory carry more risks for the university. The most serious conflicts involve the interests of students, as discussed in Section 5.

Donated equipment is common in engineering laboratories. Where the relationship with industry is close and long standing, as at the Technical University of Braunschweig, equipment may come in for a specific project and be left behind on a semi-permanent

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<sup>79</sup> University of British Columbia, Waterloo and the University of Washington mentioned formal guidelines or policies for corporate gifts.

<sup>80</sup> Preserving favorable tax status is an important technical matter, both for the donor and for the recipient university, and may be affected by the structure of the gift. For example, linking business arrangements to philanthropy could endanger the university’s tax exempt status, said a University of Washington administrator.

basis.<sup>81</sup> The pluses and minuses for students are juggled by the institute professors, along with their own interests. Particular choices may lock a laboratory into a technology trajectory for some time.

*Other products* are offered for specific programs or courses. At Carleton, companies may contribute advanced software in the hope that the professor will come up with something new and useful or they may lend the professor complex data sets to test software innovations. The quid-pro-quo is evident but not seen as a serious conflict as long as the professor is free to follow his curiosity compass. Similarly, advanced computer chips of a particular brand were contributed for classroom use. This was seen by the professor not as advertising (Intel Inside) but as teaching “basic, long term concepts” using the most current products.

It is the nature of modern technology development that a proprietary technology may come to dominate a market area and still be rich enough in possibilities that it forms a base for further discovery. A particularly dramatic case was the development at Waterloo of compilers<sup>82</sup> for IBM computers. The WATFOR compilers were a big help to IBM marketing their computers. IBM and DEC (a maker of minicomputers) gave the computer science department much equipment in appreciation and, of course, in the hope they would continue to refine and support the compiler technology. These post-hoc contributions do not seem very risky from a conflict perspective, since the department’s research directions were already well established and widely endorsed by the academic community.

Operating grants, which allow the university, departments and professors to pursue their general mandate at their own discretion, are very important to universities. Most such grants come from public agencies, but some universities obtain significant support from more or less unrestricted *endowments* from the private sector, or from the *sale or lease of public endowments*, such as initial land grants, to the private sector.<sup>83</sup>

At the universities we studied, private endowments are not seen as a threat but as an opportunity that the university community is confident it has learned how to manage. The management models, however, are very different.

At the Technical University of Braunschweig, an association called the Friends of the University does most of the fundraising. In keeping with the decentralized structure of

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<sup>81</sup> “The longer they stay the more likely that the firm will lose interest in getting them back,” Technical University at Braunschweig researcher

<sup>82</sup> A compiler is a computer program that translates instructions written by a programmer in a high-level, easy-to-manage language into simple instructions adapted to the hardware of the computer. Compilers and high-level languages were an advance because they save programmers enormous amounts of time and made programs more understandable.

<sup>83</sup> The University of British Columbia, for example, has generated a C\$90 million fund for teaching and research by granting private developers a lease on some of the university lands, which are adjacent to high value residential neighborhoods in Vancouver. Faculties can draw on the fund by raising matching funds. This model gives away some of the flexibility associated with an operating endowment in exchange for the multiplier from matching.

German universities, the largest part of the money raised is given directly to the institutes, with no accounting to the central administration. However, the amounts involved are not large and there is no strong tradition of “university giving,” as in North America.

A common model in North America is the “development office” which raises money on behalf of the university as a whole and tries to coordinate fundraising by academic departments that sometimes prefer to approach firms directly. The institution has a legitimate interest in coordination, in that leading institutional priorities might be subverted by persuasive profs seeking money for projects that support secondary institutional priorities. However, the increasing power of faculties to attract funding from private donors with specific industrial interests has weakened the role of would-be coordinators. At the University of British Columbia, faculties can raise funds and keep all the proceeds except for a small cut for the development office. A new University of British Columbia office was being established to specialize in donations, to be matched by public funds, that the university would invest in spin-off companies. At Carleton and Waterloo, departments and the research office are asked to come to the development office before they go knocking on doors. At the University of Washington, engineering and medicine were described as “worlds to themselves” with the development office dealing only with large gifts and gifts that “cross boundaries.” The devolution of influence has occurred even as some large firms have expressed frustration with the multiple points of entry and encouraged the university to establish “one-stop shopping.”

In the 1990s, the University of British Columbia took an aggressive stance to develop paid corporate *endorsements and exclusive supplier arrangements*, as an explicit response to constraints on public funding. Food products, communications services, financial services, travel services and information technology were all on the list. Agreements are confidential due at the request of the corporate donors, but contracts are sometimes worth millions of dollars. The university sees endorsements as a coming thing. The primary concern under such supplier arrangements is limits on choice and the administration must satisfy itself that the arrangement does not unduly limit the ability of faculty and others to manage their responsibilities – for example, to shop for low-cost airline travel. Because commercial enterprises on campus are generally tightly managed, even to the point of requiring advance approval of price increases,<sup>84</sup> the institution must resolve numerous conflicts when it establishes a privileged position for any one supplier.

At the other extreme, corporate sponsors at the Technical University of Braunschweig seem tentative. For example, Volkswagen gave the president’s office a van and paid the cost of putting the the Technical University at Braunschweig logo on bottles of water served at a recruitment event. Corporations also paid for some of the celebratory events for the university’s 250<sup>th</sup> anniversary. Small potatoes.

At the University of Washington, corporate sponsors are most common in areas like athletics and the medical center that it considers “self-sustaining.” Proposals for endorsements or supply relationships are often adjudicated collectively by committees representing different university constituencies. The university has turned down some

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<sup>84</sup> University of British Columbia Policies, Policy #98 Commercial Enterprises on Campus

proposals because they didn't provide an adequate return to the university. The fact that proposals are sometimes turned down as inadequate is an acknowledgment that in agreeing to such arrangements the university incurs significant intangible costs.

In summary, there are not a lot rules and regulations around sponsorship activity, but neither is acceptance of any gift a routine. Usually there is some kind of collective review and formal approval at a high level. The university is sensitive, among other things, to perceptions of "good taste." There is clear potential for conflict of interest regarding the conduct of academic affairs. A few cases were reported to us of corporate sponsors trying to exercise unwanted influence. However, such cases are usually settled without difficulty.

## References

*Could use this in a paragraph setting up the current context.*

*A note on citations: The literature on the topics covered in this paper is vast. We have not intended to present a survey of thinking in this field, but rather to present the thoughts of working academics in the four study institutions, who deal daily with the conflicts we have identified. The work we have chosen to cite, mainly from the literature on higher education, is a very partial representation of relevant work in many fields. We hope, however, that it serves as an introduction to the broad debate and recognizes important contributions on which we and many of our sources have relied in forming their views of correct action.*

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