

Inter-firm Migration of Tacit Knowledge: Law and Policy¹

WILLIAM VAN CAENEDEM

ABSTRACT *Much knowledge is diffused by the exchange of property rights in intangibles. But tacit knowledge, not being subject to property rights, is instead diffused by migration of knowledgeable individuals between firms. The law impacts significantly on this diffusion mechanism, in particular those rules that determine the use individuals may make of their tacit knowledge after migration to a different firm. The general principle underlying the relevant law is that individuals are free to migrate with all their tacit knowledge. Nonetheless there are some narrow exceptions to this principle. That these exceptions remain narrow and carefully policed by the courts is important because imposing too many restraints on use of tacit knowledge post-term would have a negative impact on real innovation.*

Keywords: Trade secrets; breach of confidence; employee mobility; tacit knowledge; inter-firm migration; intellectual property and innovation; restraint of trade.

Introduction

Literature concerning the relationship between law and technological innovation tends to focus on property markets for intangibles. Proprietary rules in intellectual property statutes convert knowledge into a tradable commodity, and thus contribute to the construction of markets for intangibles. By the operation of such markets, diffusion of proprietary knowledge occurs.

But this focus on proprietary systems masks the fact that much knowledge is not and/or cannot be covered by patent rights which are dependent on codification and recording. A very significant proportion of such non-proprietary knowledge is tacit,² i.e. it only exists in the minds of individuals.

Such tacit knowledge is not diffused by way of property-based exchanges, but by migration of individuals between firms. In other words, it is the labour market rather than the property market for intangibles that is the principal mechanism for the diffusion of tacit knowledge.

The market for individuals with tacit knowledge is regulated by labour law, but it is also influenced by trade secrets law and contract. These areas of law in particular

combine to circumscribe the rights that employees and firms have to use their tacit knowledge when they migrate between firms. They thus significantly affect inter-firm tacit knowledge migration itself.

Legal Mechanisms Encouraging Knowledge Diffusion

The policy settings expressed in the rules of intellectual property law rest on theoretical assumptions about knowledge goods. Drahos has expressed these in the following terms: 'Such goods are typically defined in terms of two qualities: non-rivalry consumption and non-excludability. Knowledge is perhaps the quintessential public good and there has long been a fundamental debate about how best to ensure its development and distribution'.³

However, the tacit/codified knowledge taxonomy compels us to review these assumptions, because *tacit* knowledge is arguably not non-excludable. Whether or not to share tacit knowledge—that is, knowledge that exists only in the mind—is a decision wholly within the power of the knowledgeable individual; others are *a priori* excluded from it. Nobody gains access to an idea in an individual's mind without her cooperation.

In other words, tacit knowledge has by nature more of the characteristics of a private good. We shall see below that the law applicable to tacit knowledge implicitly recognises this. But why then have we come to describe knowledge as a public good?

First, social and cultural norms came to favour and provide diverse incentives for the expression, recording and diffusion of knowledge (e.g. by universal free compulsory primary education); and secondly, if knowledge is to be put to any practical use, its publication is often unavoidable. In other words, if the knowledge holder is to derive a practical benefit from her knowledge, she will often be unable to avoid codifying and recording or embodying it, and thus diffusing it.⁴ Where society is attuned to the possibilities of the practical applications of knowledge,⁵ this codification and recording imperative will amount to a very strong dynamic.⁶ And once knowledge is codified and recorded or embodied, it indeed has the characteristics of a public good. It is in those circumstances that patent law intervenes to mitigate its public good characteristics.

If we accept that tacit knowledge at least, or even *all* knowledge in origin, is by nature private, but we also presume that society benefits from the diffusion of knowledge, we may choose to rely on legal mechanisms that encourage disclosure. In a market economy such mechanisms will include measures that provide potential financial rewards or material benefits to the person who makes her knowledge public. Two institutional legal mechanisms of fundamental importance provide such reward. First, one that encourages diffusion of knowledge to society as a whole by a mechanism of codification, recording and disclosure. The incentive lies in the potential but uncertain rewards flowing from property rights (patents). Secondly, one that encourages disclosure of knowledge by individuals to a firm on the basis of a contractual bargain, permitting the commercial exploitation of the knowledge disclosed.⁷ The firm has complimentary resources and organisational skills that allow it to make efficient use of the tacit knowledge so disclosed.

Codification and recording is not an essential requirement of the latter mechanism. It operates on the basis of an enforceable contractual bargain: an obligation to reveal tacit knowledge is assumed in return for a largely predetermined reward.⁸ The size of potential rewards (salary etc.) for disclosure of knowledge by

employees to firms is determined by the competitive operation of labour markets, rather than by the operation of property markets for intangibles.

The hypothesis underlying this article is that this labour market, and the legal rules and principles that underpin tacit knowledge migration on the basis of its constituent transactions, are at least as significant in terms of knowledge diffusion, as those IP laws framing the property market for intangibles. This article further posits that the law in this area should be structured so as not to unnecessarily obstruct tacit knowledge migration between firms.⁹

The Basic Legal Principle: Free Migration of Tacit Knowledge

The starting principle underpinning the relevant law is that tacit knowledge is an individual's private good. It is her own to exploit or disclose, *no matter how, when, where or from whom she has acquired or developed it*. As a consequence, she can freely undertake, in a contract of employment, to share all her tacit knowledge with a firm, without needing to account for it to any other organisation within which it may arguably originate. In other words, she is at liberty to migrate (with) her tacit knowledge between firms, free from legal restraints imposed by prior employers on its use in a new organisational context. Nor can restraints imposed on the receiving firm indirectly restrict her use of tacit knowledge.

There are certainly significant exceptions to this basic principle, based in equity and in contract. Firms *are* sometimes granted a remedy if they can trace a connection post-termination with certain specific tacit knowledge, if it has the legal character of a trade secret. Firms *are* sometimes able to enforce a contractual restraint on competition by an ex-employee, if it serves the purpose of protecting real trade secrets. However, these exceptions are ultimately limited to a very narrow category of case. I argue below that they do not significantly affect the operation of the fundamental principle.

The enduring strength of the latter is apparent from the vigilance with which the courts police attempts to derogate from it by way of contractual agreement. Contractual constraints on the freedom of an employee to work (trade), or provisions that attempt to cast the mantle of 'trade secrets' over too much of what the employee knows will either be illegal or only enforceable in very limited circumstances.

Thus the normative environment does not generally encourage firms to take legal action against former employees over allegations of misuse of tacit knowledge. Firms may also be dissuaded by non-law related factors, of course. One such may be that the value of tacit knowledge decreases with de-contextualisation: in other words, there may be reduced complementarity between the tacit knowledge imported by the employee and the other (knowledge) assets of her new firm. If as a result the new firm generates lower returns from the employee's tacit knowledge, at least during an adjustment period, then the tacit knowledge migration of that employee poses less of a competitive threat.

Furthermore, firms may also perceive themselves to be as much winners as losers from weak controls over tacit knowledge post-term. Firms cannot legally appropriate returns from the exploitation of tacit knowledge once their employees migrate to other firms, but neither can their rivals. In other words, the law may enforce a rough equivalence between firms as learning organisations (employees importing and sharing knowledge), and firms as teaching organisations (employees exporting and transferring knowledge).

The Topic of This Article

Tacit knowledge escapes the dragnet of property rights, because the law consistently makes the acquisition of property rights in knowledge dependent on codification and inclusion in some external record from which it can be accessed and understood independently of the author or creator ('recorded knowledge'). By contrast, tacit knowledge is not recorded but contained in the mind of an individual. Not surprisingly therefore, the rules that affect the use and diffusion of tacit knowledge are related to obligations of fair conduct attaching to the relationship between firm and employee—obligations of good faith or fidelity, and of confidentiality. In other words, the relevant rules determine how persons with valuable knowledge *act*, rather than determining the relationship between a person and knowledge as a legally constituted object (or 'property').

From a systemic legal perspective, the most directly relevant legal rules of this kind fall into two broad categories. First, those rules affecting how employees deal with knowledge *during* their term of employment, in particular, how they communicate such knowledge to third parties and to what extent they are entitled to exploit it for a purpose inconsistent with that of their employers; and secondly, those rules affecting how employees deal with knowledge *after* the termination of their employment (below: 'post-term').

However, in this article the focus is on sequential, not concurrent use of tacit knowledge. In other words, it does not focus on rules affecting the relationship between an employee and her present employer. The duty of fidelity that binds an employee to her present firm is stringent, since her obligation not to use her knowledge in competition with her employer, although not absolute, goes to the heart of the bargain between them. There can hardly be a valid argument against the proposition that an employee should as a general rule not be allowed to share relevant tacit knowledge with rival firms during employment, or apply it to benefit such rivals. A fairly absolute prohibition on the diffusion of tacit knowledge during the currency of the contract of employment—which would normally take the form of concurrent rivalrous work—is therefore justified.

Rather, the focus here is on rules that affect employees' use and sharing of tacit knowledge accumulated during employment *after termination of the employment contract*. Those rules determine whether the migration of an individual to a new organisational environment, equates to a migration of all their tacit knowledge, without legal limitation or constraint. Those rules also provide a *partial* answer to the question 'how does the law affect the diffusion of tacit knowledge?'. *Partial*, because a conceptual distinction refines our field of study: of interest is not so much the migration of people between firms *per se*, but the concomitant migration of their tacit knowledge. The term 'tacit knowledge migration' accurately describes the field of study, which remains within the traditional knowledge-focussed realm of intellectual property law. It is not concerned with other areas of law that might influence a person's decision to change firms, such as tax, severance law, general labour law etc.

Default Rules and Contractual Variation

The residual obligation of confidence of employees operates as an exception to the principle of free migration of tacit knowledge between firms. The right to bring an action for breach of confidence or misuse of 'trade secrets' entitles a firm in a very

limited category of case to restrict the use or communication of clearly specified items of knowledge by ex-employees post-term. This residual obligation is a default rule which can and often is enhanced by contractual means. Contract law principles recognise the enforceability of two kinds of provisions. First, restrictive covenants or non-compete clauses may entirely prohibit knowledgeable employees from migrating to new firms. However, they can only be enforced if the restriction on competition is reasonably required to protect trade secrets. And secondly, contractual provisions can purport to claim firm ownership of a wide range of knowledge in the guise of trade secrets. However, if the obligation covers an excessively broadly defined class of knowledge, even if acquired during the term of employment, it will not be enforceable in a court of law. These rules are considered in more detail in the second part of this article.

But first we must assess whether the starting principle of free tacit knowledge migration referred to above has a positive effect on innovation rates. This question is further examined below, after a more detailed investigation of the taxonomy of tacit and codified knowledge.

Clearly, in terms of innovation a balance will have to be struck between, on the one hand, the need for a firm to organise its complementary resources to permit the exploitation of an employee's tacit knowledge with optimal efficiency, and on the other hand, optimisation of the level of diffusion of tacit knowledge through employee mobility between firms. In the intellectual property market, a more efficient allocation of resources to knowledge creation is presumed to result from the free exercise of rational choice by consumers in the market for knowledge based goods, rather than from *a priori* allocation of resources to knowledge creation.¹⁰ By analogy optimal exploitation of tacit knowledge will result from two things: a firm's ability to adequately value an individual's tacit knowledge, and obtain the migration of that individual with all she knows;¹¹ and the exercise of individuals' free choice as to the organisational context in which such exploitation will be optimal.¹²

Tacit, Codified and Recorded Knowledge

The Position of Tacit Knowledge

The growth in the importance that firms attach to the effective appropriation and exploitation of their intellectual capital has been accompanied by closer attention in legal literature to the rule structures supporting those processes. At the same time, governments also have been alive to the legal issues that affect the rate and direction of technological change and innovation. Attention has been focussed largely on patents, being the primary property rights in knowledge.

Patents have undoubtedly undergone a considerable expansion in substantive and in geographical coverage, and in total numbers filed. Consequently, the relevant literature seeks to come to terms with the application of patents law to new areas of endeavour such as computers or biotechnology, and to investigate the appropriate limits of patentability, even as the science at issue develops rapidly.¹³ The nature and extent of property rights (patents), and the operation of markets for such property rights, is enormously significant.

But only a limited proportion of all knowledge is ever the subject of property rights.

To put this in terms of codification taxonomy, while codified and recorded knowledge is significant, tacit knowledge constitutes a vital component of knowledge

diffusion. And as property based rules of law have no effect on tacit knowledge, analysing such rules will teach us little about the inter-relationship between the law and the diffusion of a vast spectrum of crucial knowledge. It is not sufficient to say that such knowledge as is not the subject of property rights, is of little significance because if it were valuable, investment would be made in its codification and recording, with a view to obtaining secure property rights. A vigorous market for tacit knowledge—or a labour market for knowledgeable individuals—in fact exists; and that tacit knowledge is qualitatively significant knowledge is further contended below. In any case, if an assumption about the inherent value of patents underlies this contrasting of recorded with tacit knowledge, it is misguided: even the most cursory acquaintance with patents, reveals that many are of little value.

The Impact of the Law on Diffusion of Tacit Knowledge

The lack of attention afforded to legal rules affecting the diffusion of tacit knowledge,¹⁴ may derive from a perception that the law simply has little impact on tacit knowledge diffusion.

But this is not the case for two reasons: first, even if one were to accept that the diffusion of tacit knowledge is not conditioned by targeted legal rules, that in itself would constitute a legal principle. It does not somehow, because of the nature of tacit knowledge, unavoidably have to be so. Secondly, in fact the law *does* contain rules and principles that are directed towards tacit knowledge. Admittedly these rules operate largely in a manner that—in contrast with proprietary systems—avoids the need to document knowledge *ex ante* on the basis of statutorily defined criteria. But this simply results from the obvious practical difficulty inherent in cataloguing tacit knowledge, and from other policy concerns that have traditionally informed the relevant areas of the law, focussing on freedom of labour and of competition, rather than on migration of tacit knowledge. Since the rules affecting tacit knowledge are rules directed at individuals with such knowledge, the rights and freedoms of those individuals have crucially predominated in the relevant areas of law.

What is Tacit Knowledge?

Also bedevilling the recognition of the significance of tacit knowledge in legal discourse is the problematical nature of the tacit/codified taxonomy. Is there really such a thing as tacit knowledge? If so, how is it to be circumscribed? Is the distinction heuristically significant or inconsequential?¹⁵ It may well be that the only real value to legal analysis of the debate is that it highlights the fact that, for one reason or another, much knowledge that is valuable, is not the subject of property rights, nor of any other ‘strong’ rights that allow its use to be restrained by others. Be that as it may, the issues in the debate are worth a brief investigation.

Ongoing controversies have complicated the seemingly simple proposition that some knowledge is codified and recorded, whereas other knowledge exists only in the mind. A first question is whether the distinction turns on inherent characteristics or on external parameters: is tacit knowledge, rightly so called, only knowledge that cannot be codified and/or recorded, or does it also include knowledge that could be, but is not (yet) codified and/or recorded? A further question which logically follows is whether there *is* in fact knowledge that cannot be codified.¹⁶ Some scholars accept the proposition that all knowledge can be codified: whether it ever

is, is then purely a matter of the level of resources applied to codification and recording.¹⁷ This would leave the category of tacit knowledge as containing nothing more than 'knowledge that is not codified' and nothing that is inherently uncodifiable. At another level this aspect of the debate concerns the question under what conditions knowledge transfers by codification and recording are in fact efficiency-enhancing.¹⁸

A further question is whether knowledge that cannot be codified is in fact wrongly referred to as 'knowledge', because it is in truth skill, talent or ability. Here the example of the surgeon commonly figures: the ability to manipulate a scalpel is acquired by practice, is difficult if not impossible to codify or record in all its aspects, and can thus only be transferred by observation and imitation. Is this a form of tacit knowledge, or a skill? And is part of it talent, innate and unlearnable? Or is it wrong to divorce skill from knowledge, might it be appropriate to refer to skill as a form of knowledge: a knowing, if unconscious, how to do things?

Codifying and Recording Knowledge

Two significant points need to be made about the debate. The first tackles the terminological issues; the second cautions against ascribing too much importance to them.

Some of the terminological confusion may in fact flow from a failure to distinguish between two distinct processes: that of codification, and that of recording. If knowledge is or can be articulated—cognitively expressed in language, then it is codifiable; if it is purely intuitive, then it is not.¹⁹ To ask whether some form of knowledge is codifiable then, is to ask whether it is possible to translate it into a language, articulated in the mind. Whether or not it is expressed in some external record is an entirely different question, even though codification is a precondition of external recording.²⁰ This means that if it is inherently uncodifiable in the proper sense of that term, then no manner of dedication of resources could render it into codified and recorded form.

But is knowledge that cannot be codified then correctly described as 'knowledge'? It may be better described as ability or talent, something *innate* that cannot be acquired by learning or doing. Ability and talent are not forms of knowledge, since they are determined by an individual's genetic makeup, and the term 'knowledge' implies acquisition by learning or by doing.

There exists a penumbra, where it may be difficult to distinguish clearly between the kind of knowledge generated by experience which is difficult to codify, and talent or innate ability. Knowledge may remain uncoded but be readily codifiable, or codifiable but only with relative difficulty, and uneconomically; and yet other knowledge may be uncodifiable but should nonetheless be distinguished from talent because it isn't innate. Such knowledge may be better referred to as skill, which is or can be acquired, but only by imitation.

These categories are complex. It may be better therefore to refer to 'tacit knowledge' as including all knowledge that is not recorded: it may be codified, uncoded or maybe even uncodifiable, subject to the reservation expressed above. Tacit knowledge may then be contrasted to 'recorded knowledge': knowledge that is codified and contained in an external record. The tacit/recorded and the codified/uncodified distinctions are then seen as separate and concerned with different issues. The tacit/codified distinction is then redundant.

Interesting for our purposes is that while *in theory* the law draws a distinction between codified knowledge in the abovementioned sense (trade secrets that belong to the employer) and uncoded knowledge (skill, experience and know how that belongs to the employee), in fact a firm will rarely be able to exercise a legal claim to an employee's codified knowledge post-term unless it is also recorded. So in practice much will turn not on whether knowledge is codified or not, but on whether it is recorded or not—on the tacit/recorded distinction rather than on the codified/uncodified distinction. The significant result is that an employee is largely free to migrate with all her unrecorded knowledge (that is tacit knowledge in the commonly understood sense of the word), whether it is codified, uncoded but codifiable, or uncoded knowledge. We will see that the theoretical exceptions to this rule, where a firm *can* set out to prove that an employee has taken some piece of codified *but unrecorded* knowledge that rightfully 'belongs' to it, can in practice rarely be invoked successfully.

In other words, the law recognises but fudges distinctions between various forms of tacit knowledge, accepting that such distinctions are fraught with practical difficulties. This tendency to fudge makes it very difficult for firms to argue successfully that any form of codified but unrecorded, or even uncoded but codifiable knowledge is theirs and should not be used by an ex-employee. In the result, all forms of unrecorded knowledge—tacit knowledge, in common parlance—tend to escape any attempt at post-term appropriation. In other words, in practice individuals are largely free to migrate between firms with all their tacit/unrecorded knowledge, whether or not a firm can demonstrate that that knowledge originates with it.

The second point mentioned above questions the manner in which the debate is conducted. The effect of attempting to define tacit knowledge is often to deprive it of its essentially human context. 'Tacit' and 'codified' are treated as if they were equivalent categories, resulting in tacit knowledge being discussed as if it were a clearly separate entity. Arguably the essential characteristic of tacit knowledge is its human-connectedness, and its dynamic and interactive character.²¹ Tacit knowledge is not separate from the individual: the essential category is arguably not 'tacit knowledge' but 'a person with tacit knowledge'. Significantly for the debate about law and the diffusion of knowledge, it is more appropriate to refer therefore to 'tacit knowledge migration' rather than 'transfer of tacit knowledge'.

Tacit Knowledge Migration

The Legal Context of Knowledge Diffusion

An important assumption underlying the legal mechanism of proprietary rights in intangibles, is that a property based market constitutes an efficient mechanism of knowledge diffusion. But other pathways of knowledge diffusion are equally embedded in legal mechanisms. Tacit knowledge, i.e. knowledge that is codified or uncoded but not recorded—that exists only in the mind of an individual—is diffused by the migration of individuals between firms. This migration of knowledge is itself embedded in legal structures.

Inter-firm migration is potentially an *efficient* way to transfer tacit knowledge, either because such knowledge is in any case uncoded, or because the process of codification and recording is too costly, or ineffective.²² As Roberts indicates, knowledge is transferred by socialisation, education and learning, and organisations and institutions 'have a central role in the transfer of knowledge'.²³ Market

mechanisms which allow the exploitation of tacit knowledge by the organisation which most values its use, thus increase efficiency.²⁴ This means that the employee must be relatively unencumbered in migrating to the organisation which values her tacit knowledge most highly.

But the ability to move knowledge to a new organisational environment also stimulates innovation. Tacit knowledge migration engenders the creativity upon which real innovation relies:²⁵ i.e. it is critical to new knowledge creation as opposed to the mere leveraging of existing intangible assets.²⁶ It may also be the case that in an era where patent-consciousness engenders firm-level secrecy, mobility of tacit knowledge is even more significant, since to some extent it circumvents patent inspired secrecy.²⁷

If the acquisition of tacit knowledge by hiring is impeded by the claims of other firms (previous employers) to such knowledge, the process of inter-firm knowledge migration is disrupted. Furthermore, given that to the hiring firm tacit knowledge has characteristics of inherent unknowability, an approach which largely disallows claims to it by other firms makes sense. Not only would the ability of a hiring firm to value the tacit knowledge of a potential employee otherwise be undermined, so would the ability of the individual to determine in which firm her tacit knowledge can be most efficiently utilised²⁸—in other words, to recognise the complementarity of the resources of other firms.

But the ability of firms to acquire knowledge is influenced by the legal construction of knowledge acquisition in a further manner. A firm may have a choice between acquiring knowledge as codified in a record, or acquiring it as tacit knowledge of an individual who can be hired. One determining factor may be the legal appropriability of the knowledge. For instance, acquiring some knowledge in codified form (e.g. by studying published patent specifications) may be useless because the law renders it illegal to use it. Acquiring a granted patent may be very useful on the other hand. So also, hiring an employee with a certain knowledge set may be useful, if the employee is not restrained from using any of that knowledge (e.g. coming straight from university). On the other hand, hiring an employee from another firm may be less useful if the law allows claims by that other firm that restrict access to that employee's tacit knowledge.²⁹

The important role the law plays in this form of knowledge diffusion may be masked by the fact that in legal discourse, principles underpinning labour mobility are not derived from innovation policy rationales. Rather, they originate in theories about freedom of labour, and opposition to restraints on competition.

But whatever the reasons, the law does favour free migration between firms, and as a general default rule, the freedom of the employee to transport any tacit knowledge acquired.

The Law Must Balance Tacit Knowledge Migration and Organisational Stability

However, another significant goal is the efficient organisation of labour and other firm assets. If no restraint is placed on tacit knowledge migration the employment decision would be affected by too much uncertainty. In knowledge rich, R&D based industries, investment in complementary assets is required to derive competitive benefit from knowledgeable employees.³⁰ Such employees may also require a considerable period of acclimatisation and adaptation; their skills may not be readily substitutable. Also, knowledge generation requires a coordinated team effort. The interests of the firm or organisation in a degree of predictability based

on binding contracts that pre-determine the parameters of a relationship with a knowledgeable individual, thus compete with the interest in unrestricted tacit knowledge migration.³¹ The law must strike a balance between on the one hand, the efficient exploitation of knowledge within an organisation, and on the other, the efficient diffusion of knowledge between organisations through tacit knowledge migration.³² While it may be desirable to formulate legal principles that protect the diffusion of tacit knowledge through employee mobility, it may also enhance the efficiency of intra-organisational exploitation of tacit knowledge to restrict mobility to a certain degree. Thus the law must also take into consideration the impact of different rule settings on the level of incentive for an employee to share her knowledge with a firm. If the settings of the law were to encourage firms to pursue legal claims to tacit knowledge post-term, the incentive for the employee to reveal all she knows to her present employer and therefore maximise the potential benefits from her organisational integration would be diminished. There would be a stronger incentive for the employee to be wary of indicating what she knows, if the employer was in a position to lodge unpredictable future claims to it. This goes back to the point made initially, that it is important that the law provides sufficient incentive for the disclosure of otherwise private knowledge within the confines of the firm.

A further significant factor supports the law's policy in relation to tacit knowledge migration: the overall profit/loss balance to the firm under present legal conditions may be neutral. Whereas it may result in a loss of tacit knowledge, it will also result in the acquisition of such knowledge free of claims from other firms. One knowledgeable employee may go but another may come.

All this is not to say that firms can never be successful in relation to legal claims to the tacit knowledge of an ex-employee: as pointed out above, in exceptional circumstances they can be. But it is of course not only the nature of the legal rules which influences a firm's decision whether or not to pursue a claim against an ex-employee; that other factors play an important role must be kept in mind when considering the legal picture. Maybe the most important point here is that knowledge is contextual.³³ In other words, knowledge in one environment—with enhanced complementarities—will be more valuable than the same knowledge in a different environment. This leads us to speculate that one reason why employers rarely take action against ex-employees may be that the value of their tacit knowledge is much reduced in their new organisational context or firm.

Legal Rules Affecting Employee Mobility

Introduction

The decision of a knowledgeable employee to migrate to a new firm is of course determined by many disparate factors. They include personal circumstances, firm specific conditions, industry structures and social norms. Here we are concerned with regulatory or legal settings as a factor influencing mobility, and particularly the rules that relate directly to the use of tacit knowledge.

The relevant legal principles are largely judge-made, having evolved over time with little interference from parliament.³⁴ Traditionally the courts have been attuned to the right of workers freely to seek employment; to the public interest in individuals being able to apply all their talents and experience without restraint; and to the free market imperative. The potential effect of the relevant legal norms on innovation or knowledge diffusion is not a factor expressly taken into account.

As indicated above, the areas of law that are most relevant post-term are, on the one hand, the equitable action for breach of confidence and on the other hand, contract law relating to the enforceability of confidentiality provisions and of restrictive covenants in contracts of employment. The two sets of rules are interconnected, as is apparent from the more detailed discussion below.³⁵

Breach of Confidence and the Duty of Fidelity

The law makes a significant distinction between the legal appropriation of tacit knowledge during the term of the contract of employment, and after its termination (or post-term). During employment the legal framework is the overarching duty of fidelity owed to the employer.³⁶ Generally speaking the employee is under a legal obligation to use knowledge relevant to her duties only in a manner that does not harm the interests of the firm. This amounts to a duty not to compete with the employer during the term of employment in areas which draw on knowledge connected to the firm's business.³⁷

Naturally, these obligations have practical limitations. Even though an employee may strictly speaking be under a legal obligation to disclose tacit knowledge that may advance the interests of the firm, she can scarcely be *forced to divulge* tacit knowledge. Such knowledge is by definition unknowable by others and often inchoate. Thus there is rarely effective legal recourse available against an employee who chooses not to do so and goes on to exploit an idea, earlier conceived, post-term.³⁸ The firm's legal appropriation of tacit knowledge resulting from fidelity is comprehensive.

Although it applies in principle only during the term of employment, the nature and extent of the duty of fidelity during employment is not irrelevant in relation to the mobility of an employee. The courts sometimes grant a remedy post-term, by tracing back to a breach of the duty of fidelity which occurred while the employee was still employed—e.g. where the employee can be shown to have deliberately copied confidential files just prior to departure.

But our main focus here is nonetheless on the narrower obligation of confidence which persists post-term, because in this equitable obligation (the legal means of protection of 'trade secrets') lies the answer to our core question: to what extent can a firm restrict an ex-employee from using tacit knowledge post-term? We shall see below that generally speaking, the action for breach of confidence only succeeds in a narrow category of case. As a result, firms have sought, as an alternative strategy, to restrain employees by contractual means from using tacit knowledge in a competitive manner for a period after termination. In other words, they attempt to extend their legal appropriation of tacit knowledge by imposing restrictive covenants or broad contractual definitions of trade secrets; but these are practices which courts have barely tolerated.

Knowledge Protected by the Action for Breach of Confidence

The common law does not recognise property rights in trade secrets. This means that a remedy for a breach of confidence continues to be founded in equity, an area of law whose essence is to enforce conscionable conduct, good faith, in relationships of trust. Equity aims to protect not the relationship between a person and a reified intangible, but the relationship within which this intangible has passed between parties.

The evidence tendered by the ex-employer to succeed in a breach of confidence action must suffice to establish the following elements on the balance of probabilities: the knowledge must be clearly identifiable, itemised and specific (sometimes the term 'documented' is used); it must have been communicated, obtained or generated in circumstances that expressly or by implication impose a duty of confidence on the recipient; it must not be in the public domain; it must be connected to the duties the employee had; and the knowledge must be used or communicated in a manner that is contrary to the obligations regarding its use.

In practice, the various elements commonly present serious evidentiary hurdles: they are of their nature difficult to prove, above all where the knowledge is tacit, i.e. is not codified and recorded. Tacit knowledge is per definition not recorded in some form which represents submissible evidence. The relevant evidence will very often only be fully known or available to the defendant, and any external traces of the employee's tacit knowledge will be difficult to trace back.

Significant difficulties also flow from the fact that tacit knowledge is a seamless mass not consisting of readily identifiable isolated items. In fact this can be said about all knowledge: patent law attempts to overcome this difficulty by formulating detailed *a priori* requirements in an attempt to narrowly delineate excised items of knowledge—to circumscribe an invention. But success in such endeavours comes at a considerable administrative cost. When it comes to confidential tacit knowledge the identification and excision process is in effect conducted *ex post*.

A firm is most likely to be successful if knowledge is codified and expressed in some record, that the employee has allegedly made off with. The physical record can then function as the boundary of the knowledge concerned, often clearly identifying its origins. But tacit knowledge is by definition not codified or recorded, so in relation to such knowledge chances of success are very much reduced. It will also be much more difficult for a firm to prove the when and the where of the source of the knowledge, and its connection to the erstwhile duties of the employee.

The Skills/Trade Secret Distinction

The weak evidentiary position of the firm is further attenuated by policy motives: that the employee should be free to use her 'tools of trade' for her own benefit and that of society at large. Skill, experience, general knowledge acquired on the job—tacit knowledge in a broad sense—are all tools of trade. In a sense courts enforce a policy which views firms as primarily teaching and learning organisations, which build knowledge and skills of whose most efficient exploitation the employee is the best judge. In an action for breach of confidence against an ex-employee, courts will thus draw a careful distinction between genuine trade secrets—which the firm should be able to continue to appropriate—and such tacit knowledge as the employee should be free to dispose of, which the cases refer to as know-how, skill and experience or terms to that effect. Such know-how is more than just talent, because the courts quite clearly accept that this category contains knowledge that is learned or acquired, not innate.

There is a further motivation for upholding the distinction: the concern that an action for breach of confidence should not be an instrument that can be wielded to unduly restrain competition. In other words, a crucial distinction is drawn between legitimately restraining an ex-employee from using a genuine trade secret, and attempting to prevent an ex-employee from using what she has learned

on the job to compete effectively.³⁹ Because of the seamless nature of knowledge and experience, any attempt to restrain an employee from using certain tacit knowledge has a dangerous tendency to restrain her from effectively using a whole lot more.⁴⁰ For this reason courts have tended to be even more protective of competition and of the rights of individuals to work to their full potential in the face of claims by ex-employers. As indicated above, such freedom is seen as beneficial both to them and to society as a whole, and courts have used various legal devices to safeguard it.

Faccenda Chicken stands for the basic distinction, policed by the courts, between a genuine trade secret belonging to the employer, and know-how, skill and experience belonging to the employee.⁴¹ In practice this is of course a distinction which is often difficult to draw, for reasons that we have addressed above, and most importantly so in relation to unrecorded knowledge. This further reduces a firm's chances of success in legal action. The distinction has been further developed and refined in later cases. These, although arguably trending on some views towards improving the position of the firm, have simply introduced a further element of uncertainty, with a resulting chilling effect.⁴²

Whatever the correct appraisal of the latest state of the law may be, any variations are of a detailed nature and do not greatly detract from the basic principle: processes of tacit knowledge migration between firms are largely untouched by the law. Even in cases where it was *unique to a firm*, employers' legal claims post-term have failed, because the knowledge concerned was accumulated by an employee over time in the course of the normal execution of her duties, and was neither specifically recorded nor specially protected as a trade secret.⁴³ In other words, although by dint of her general duty of fidelity an employee may be under an obligation not to reveal or misuse certain knowledge that is unique to the firm, that tacit knowledge does not thereby amount to a trade secret 'protected' by the action for breach of confidence post-term: a court may well treat it as know-how, skill and experience.⁴⁴ In any case, courts have a tendency to treat things that an employee has learned by normal processes of observation and 'doing' on the job as know-how, skill and experience rather than trade secrets.⁴⁵ It will be different if knowledge is contained in a record, like a list or manual, or if the learning process really amounted to a deliberate attempt to gather information and so misappropriate a trade secret.

In any event, what is perhaps most significant is that both conceptually and practically speaking courts will always find it difficult to make the distinction between a genuine trade secret, and the skill, knowledge and experience of an employee—their tacit knowledge. This renders the outcome of any attempt to enforce an alleged obligation of confidence very uncertain. The risk and expense involved, taken together with non-legal reasons (e.g. lack of value to a new firm, give and take) explains why firms tend not to be motivated to pursue an ex-employee over alleged misuse of tacit knowledge.

The portability of tacit knowledge is therefore hardly restrained by the default rules of equity (commonly treated as part of intellectual property law). It is other rules, of labour law and contract that will potentially affect the employee's ability to migrate freely with her tacit knowledge. The former is not the topic of this article, but contract law where it attempts to vary the default rules discussed above, is further explored below. We shall see that as a general rule, contractual autonomy in relation to the extension of obligations of confidentiality post-term is overshadowed by the courts' aversion to restraints of trade.⁴⁶

Contractual Extensions of Obligations of Confidentiality

What are described above are indeed default rules: they apply in the absence of agreement to the contrary expressed in the contract of employment. Given the uncertainties and limitations inherent in relying on the action for breach of confidence, firms are motivated to seek recourse to contractual restraints that clarify and/or go beyond the default rules. One option is to seek the agreement of an employee to accept limitations on the use post-term of a spectrum of knowledge contractually extended beyond that which equity will ordinarily recognise as a trade secret.

But this judges regard with disfavour. Courts have tended to discount the autonomy of contractual agreement in favour of broader policy goals, overriding private bargains that attempt to describe the category of 'trade secrets' or 'confidential information' too widely, as being contrary to public policy—the same arguments that limit the scope of the action for breach of confidence. Such provisions for instance, as claim to extend the obligation to knowledge that can be readily ascertained from public sources, have been held unenforceable.⁴⁷ In other words, it is difficult for firms to treat as confidential information contractually, such knowledge as does not meet the requirements of equity for that classification.

Nonetheless a firm may be able to extend the reach of legal appropriation by carefully drafted contractual clauses, at least by some margin. But it will only be possible to do this either very specifically, referring to identified items of codified and recorded knowledge, or else in terms of categories that amount to genuine and practical identifiers. Any attempt to enforce a contractual claim expressed in terms of general and/or all tacit knowledge is doomed to fail. It would in any case be impracticable to enforce such claims, as knowledge is indivisible and evolves over time.

Thus contractual provisions extending the obligation of confidence usually will be either too narrow to have much impact in relation to tacit knowledge, or so broad as to falter on the rocks of uncertainty or public policy. Furthermore, even if certain knowledge is classed in a contract of employment as confidential information or a trade secret, a line will still have to be drawn between that and the general know-how, skill and experience of the employee—her tacit knowledge; hence the same difficulties plaguing the employer in breach of confidence cases will arise if she chooses to proceed on the basis of a breach of contract.

Restrictive Covenants

Faced with the uncertainties in relation to the kind of contractual provisions described above, firms attempt indirectly to appropriate tacit knowledge by a further contractual device: a general restraint on competition, or 'restrictive covenant'. It is arguably here that we come to the most crucial aspect of this area of the law.

The starting principle is clear: contractual restraints on general competition by an ex-employee are against public policy and hence unenforceable at law.⁴⁸ This is even the case where there is no doubt about the quality of the bargain itself. The public interest in employees' free participation in competitive markets overrides contractual agreements even voluntarily entered into that restrain her freedom to use all her tacit knowledge and skills to advance her own and/or another firm's interests. Private bargains which have the effect of isolating one party from

competition with the market as a whole (so with parties including others than the contractor) are undesirable.

However, the courts will enforce *some* restrictive covenants under a recognised exception to general illegality, if they are reasonable and connected to the protection of genuine trade secrets. Despite the strict limits of this exception, firms are motivated to negotiate restrictive covenants: they may calculate that a legal challenge is unlikely; that non-legal or customary norms in an industry will encourage compliance; or that the compensation offered for the covenant will be adequate to dissuade breach. The existing uncertainty about the permissible scope of restraints may not be a discouraging factor; it may in fact encourage inclusion of restraints of impermissible scope. We do not in fact know to what extent restrictive covenants are observed, or to what extent they are ignored without any resulting court action.

Reasonable Restraints

As mentioned, the courts have held restraints of trade enforceable if they are reasonably required to protect genuine trade secrets or confidential information.⁴⁹ Thus two elements must in fact be established: that the firm has trade secrets to protect in this manner; and that the restraint is reasonably adopted to the purpose of protecting them.⁵⁰ A restraint must thus be limited in time and/or area of operation, but there is no hard and fast rule as to what limitations are reasonable: it will depend on the circumstances.⁵¹ Although there has been some fluctuation in terms of the width of allowable restraints, and in terms of the kinds of knowledge which it is legitimate to protect by a restrictive covenant,⁵² on the whole the courts have again erred on the side of caution and employed various limiting mechanisms.

Nonetheless an enforceable covenant is arguably the most significant and effective restraint the law permits on the migration of tacit knowledge, even if its extent is limited in time and place. As indicated above, the fact that certain restraints of this nature *are* enforceable may well have an effect that goes beyond what is visible in the cases: employees may be unwilling to challenge any restraint, freely entered into, in the courts, either because of industry standards, norms or customs, or because of the cost and uncertainty of litigation. If an employee has sought employment in breach of a covenant, the new employer will unavoidably be involved in the issue of breach, and it may depend on that firm's willingness to play a role whether an employee chooses to breach a covenant and resist a previous firm's attempts to enforce it in a court of law.

There is a question therefore whether, in the case of knowledgeable employees in R&D based industries, the restraint on mobility imposed by enforceable restrictive covenants is more counterproductive than is apparent from the cases. It may be that the balance between the public interest in encouraging tacit knowledge migration and the private interest of individual firms in reliable planning of its future exploitation requires a reassessment in this context.

Conclusions Concerning Tacit Knowledge and the Law

In the result, a firm has extensive legal rights over the tacit knowledge of its employees while employed; but employees are free to migrate between firms with the overwhelming majority of their tacit knowledge. A firm can only appropriate

by law a very small fraction of the tacit knowledge of an ex-employee. The law thus attaches consequences to temporal rather than to substantive connections between tacit knowledge and the firm. The most significant forensic enquiry is not 'from which firm did the employee originally acquire this or that piece of knowledge?', but rather 'who does the employee with that knowledge work for now?'. In other words, a firm will rarely succeed if it attempts to trace the tacit knowledge of an ex-employee back to itself or its own knowledge resources or 'teaching' processes.

The principal exception lies in the domain of very specific knowledge, which in the vast majority of cases will be codified and recorded, rather than tacit. All other knowledge the employee is free to migrate with and shall not have to account for to any previous employer. Thus an employee can generally join a new firm with little concern about using knowledge obtained previously, except for very specific items. And firms can hire an employee safe in the knowledge that they will be able to obtain full disclosure of and benefit from what that employee knows, without being beholden to any previous employer. This may seem an obvious position to adopt, but in fact the law need not necessarily be so: in other areas of IP law, agreements are commonly based on tracing: think for instance of sponsorship arrangements for sporting identities.

Conclusion

The law applicable to tacit knowledge migration has traditionally been dominated by policy concerns unconnected with innovation. Its origins lie in the recognised rights and freedoms of individual workers, and in competition concerns. Nonetheless the rule settings do promote tacit knowledge migration by imposing few legal restraints on the use of such knowledge post-term. This article suggests that the present balance of the law, irrespective of how it came about, is therefore generally favourable from an innovation policy perspective.

Nonetheless, two contemporary trends in particular cause some concern: towards greater acceptance and enforceability of restrictive covenants in general (the 'legal autonomy' approach); and towards permitting a broader class of information than strict trade secrets to be protected by a restrictive covenant. These trends—if such they indeed are—have little to commend themselves from an innovation perspective. It is thus important that the courts continue to 'hold firm' in these areas to the significant principles that have been developed over time and do not allow developments at the margins gradually to undermine their continuing vigorous application.

The settings of trade secrets law have long been considered a factor underpinning disparities in national innovation performance. At the level of comparative law, the tacit knowledge migration perspective may add a useful framework to this analysis. At the level of comparison between industries as well, differing normative choices and observance, for instance relating to restrictive covenants, may help to explain why technological transformation and a highly mobile workforce seem to go hand in hand in some industries, such as computing—the Silicon-valley phenomenon.

More generally speaking, firms might think it in their own interest to attempt to appropriate tacit knowledge post-term in various ways. However, they cannot be expected to factor in the public interest in the mobility of that knowledge. This is the task of lawmakers and the courts.

Notes and References

1. My thanks to Peter Hall and his colleagues Max Tani, Garrett Upstill and Gary Lea at the UNSW/ADFA in Canberra and also to Peter Drahos of RSSS at ANU and Ulf Petrusson of the University of Gothenburg for helpful comments and discussions. The Faculty of Law at Bond University, Gold Coast, Queensland funded the invaluable help of my research assistant, Annie Gagne.
2. See Michael Polanyi, *Personal Knowledge: Towards a Post-critical Philosophy*, Routledge and Keegan Paul, London, 1958; and M. Polanyi, 'The logic of tacit inference', *Philosophy*, 41, 1966, pp. 1–18.
3. P. Drahos 'The regulation of public goods', *Journal of International Economic Law*, 7, 2, 2004, pp. 321–99, at p. 321.
4. Mansfield refers to 'embodiment' to describe knowledge that is included in things rather than in codes: see Edwin Mansfield, *The Economics of Technological Change*, Norton & Co, New York, 1968, pp. 3–4, as referred to by Drahos in 'The regulation of public goods', *op. cit.*, p. 328.
5. See W. van Caenegem, 'Intellectual property and the idea of progress', *Intellectual Property Quarterly*, 3, 2003, p. 237.
6. B. Ancori, A. Bureth and P. Cohendet point out that expansion of the codified knowledge base is often seen as the key characteristic of the development of modern economies and this has 'contributed to the legitimization of the approach whereby the analysis of knowledge is restricted to its codified form': see B. Ancori, A. Bureth and P. Cohendet, 'The economics of knowledge: the debate about codification and tacit knowledge', *Industrial and Corporate Change*, 9, 2, 2000, pp. 255–87 at p. 256. They maintain this view is challenged by evolutionary economists and others who '[...] highlight the importance of the learning processes by which knowledge is produced and underline its contextual features. Even the most codified knowledge-scientific knowledge-cannot systematically be transferred [...] scientific knowledge is not diffused; it is replicated with high costs, because what is [sic] replicates are the structures of research [...] and not the results themselves' (at p. 257). Roberts also criticises the focus on codification: '[K]nowledge is distinct from information; indeed, it is more than information, since it involves an awareness or understanding gained through experience, familiarity or learning. [...] Knowing is an active process that is mediated, situated, provisional, pragmatic and contested'. See J. Roberts, 'The drive to codify: implications for the knowledge-based economy', *Prometheus*, 19, 2, 2001, pp. 99–116 at p. 110; citing F. Blackler, 'Knowledge, knowledge work and organizations: an overview and interpretation', *Organization Studies*, 16, 6, 1995, pp. 1021–46.
7. See on the balance between intra-firm incentive and external incentive to create, B. Holmstrom and P. Milgrom, 'The firm as an incentive system', *The American Economic Review*, 84, 4, 1994, pp. 972–91. The authors point out that inventive or creative work demands a relatively high degree of autonomy and freedom of action, as well as communication, which tends to sit badly with the nature of internal organisation, and better with external contracting. In commenting on the choice between internal procurement and external contracting, they point out that the former usually involves supervision, use of firm resources and fixed wages, whereas the latter tends towards freedom of action, use of tools by the contractor and payment on the basis of what is supplied (at p. 972).
8. Naturally employment is not the only organisational structure an individual can opt for when undertaking inventive activity; independent work as an external contractor is the principal alternative. The standard consideration for an employee is salary, which is relatively inflexible, and Holmstrom and Milgrom ask whether it might constitute a sub-optimal incentive. They point out that '[...] the use of low-powered incentives within the firm, although sometimes lamented as one of the major disadvantages of internal organization, is also an important vehicle for inspiring cooperation and coordination' (*Ibid.*, p. 989). As to the advantages and disadvantages of organisation as a firm, and concepts of the firm, see D. Burk, 'Intellectual property and the firm', *The University of Chicago Law Review*, 71, 2004, p. 3.
9. Migration of tacit knowledge between firms can be on a non-competitive basis: see J. Gans, D.H. Hsu and S. Stern, 'When does start-up innovation spur the gale of creative destruction?',

- Rand Journal of Economics*, 33, 4, 2002, pp. 571–86 (concerning cooperation vs competition approaches to knowledge creation).
10. Such allocation is characteristic of planned economies but also of public sector research; see concerning planned innovation, W. van Caenegem, 'Inventions in Russia: from public good to private property', *Australian Intellectual Property Journal*, 4, 1993, p. 232. For a consideration of a non-market approach, see S. Shavell and T. van Ypersele, 'Reward versus intellectual property rights', *The Journal of Law and Economics*, 44, 2001, pp. 525–47.
 11. At the time of initial bargaining both employer and employee know relatively little about each other's tacit knowledge and trade secrets, which, as Merges points out is '[...] notoriously difficult to disclose [...] in a bargaining context': see R. Merges, 'The law and economics of employee inventions', *Harvard Journal of Law & Technology*, 13, 1999, pp. 1–54 at p. 23.
 12. A regulatory environment where migration between firms is not excessively restrained by other norms is presumed.
 13. See e.g. M. Lemley, 'Ex ante versus ex post justifications for intellectual property', *The University of Chicago Law Review*, 71, 2004, p. 129. See also J. Duffy, 'Rethinking the prospect theory of patents', *The University of Chicago Law Review*, 71, 2004, p. 439; W. Kingston, 'Innovation needs patent reform', *Research Policy*, 30, 3, 2001, pp. 403–23; W. Kingston, 'Why harmonization is a Trojan horse', *European Intellectual Property Review*, 26, 10, 2004, pp. 447–60; and W. Kingston, 'Intellectual property needs help from accounting', *European Intellectual Property Review*, 11, 2002, pp. 508–15.
 14. The parameters of the relevant literature are interestingly circumscribed in O. Granstrand, 'Innovation and intellectual property studies', in Ove Granstrand (ed.), *Economics, Law and Intellectual Property*, Kluwer Academic Publishers, 2003, p. 9.
 15. See R. Cowan, P. David and D. Foray, 'The explicit economics of knowledge codification and tacitness', *Industrial and Corporate Change*, 9, 2, 2000, pp. 211–53. In their critique of this paper, B. Johnson, E. Lorenz and B.A. Lundvall, in 'Why all this fuss about codified and tacit knowledge', *Industrial and Corporate Change*, 11, 2, 2002, pp. 245–62, closely investigate the usefulness of the terms and deplore their vagueness and crudity. See also in the same issue, P. Cohendet and W. Steinmueller, 'The codification of knowledge: a conceptual and empirical exploration', *Industrial and Corporate Change*, 11, 2, 2002, pp. 195–209; and Ancori *et al.*, *op. cit.* See also P. Nightingale, 'If Nelson and Winter are only half right about tacit knowledge, which half? A Searlean critique of "codification"', *Industrial and Corporate Change*, 12, 2, 2003, pp. 149–83; and R. M. Casselman and D. Samson, 'Moving beyond tacit and explicit: four dimensions of knowledge', *IPRIA Working Paper*, June 2004 (available from the Intellectual Property Research Institute of Australia website at <http://www.ipria.org/publications/workingpapers.html>).
 16. Nelson argues certain human pursuits are resistant to codification: see R. Nelson, 'On the uneven evolution of human know-how', *Research Policy*, 32, 6, 2003, pp. 909–22.
 17. Ancori *et al.*, *op. cit.* set out the two extremes, the 'absolutist position on codification' (all knowledge can be codified), and the 'absolutist position on tacit knowledge' (codified and tacit knowledge are complementary; at p. 257). They emphasise the difference between information and knowledge. According to Nelson, researchers such as Cowan and Foray have argued that 'the extent to which a technique is tacit or articulated and codified depends to a good extent on the magnitude and skill of the efforts to codify it' (Nelson, *op. cit.*, at p. 920).
 18. Roberts emphasises that the drive to codify comes at the expense of tacit knowledge: 'It is argued that the codification of knowledge favours procedural thinking and creativity whilst also reducing ambiguity and uncertainty. Intuitive thinking and serendipitous creativity, which often occur in ambiguous and uncertain circumstances, are consequently neglected' (Roberts, *op. cit.*, at p. 100). Roberts also emphasises the 'dynamic qualities [of knowledge] and its connection to a specific social and cultural context' (also at p. 100). Johnson *et al.*, *op. cit.* at p. 4 say that Cowan, David and Foray, whom they criticise on many points, do recognise that codification is not the only way in which knowledge is made available for transfer, because they recognise that 'Thick labour markets may substitute for the transfer of codified knowledge and knowledge may be stored in the people belonging to an organisation'. They

- stress that codification can in fact *decrease* efficiency because of a misallocation of resources. Codification misses things that are not codifiable: 'Crucially important connections between different kinds of knowledge have been cut in a futile pursuit of codification based on exaggerated expectations of its benefits. The realm of tacit knowledge has been decreased and it is not obvious that it has been "to good effect"' (at p. 7).
19. In terms of the human element in communication, Marschak distinguishes between transmission which is best conducted by machines, and the processes of encoding and decoding, which are human tasks: see J. Marschak, 'The economics of language', in D. Lamberton (ed.), *The Economics of Communication and Information*, Edward Elgar, Brookfield, USA, 1996, at p. 523. As to 'articulation', see Nightingale, *op. cit.*
 20. Newmeyer points out that language has two distinct purposes: one is for cognition, that is 'for the representation of meaning and the process of thinking', the other is the application of language 'as the primary agent of interaction among members of our species'; in other words-communication; see F. Newmeyer, 'Cognitive and functional factors in the evolution of grammar', *European Review*, 12, 2004, pp. 245–64, at p. 246. Codification relates to the use of language for cognitive processes.
 21. Ancori *et al.*, *op. cit.* point out that tacit knowledge is required to make sense of codified knowledge; and knowledge is, as well as being individual, also social and embedded: knowledge results from a social process. There is a risk of undervaluing the learning process and overvaluing the transfer of codified knowledge: the latter is only part of the story of the exchange of knowledge and information. The authors point out that '(i) knowledge is closely dependent on the cognitive abilities of the actors who hold it and (ii) knowledge cannot be considered separately from the communication processes through which it is exchanged' (at p. 265).
 22. As division of labour becomes more complex, the importance of the efficient exchange of information grows: see A. Leijonhufvud, 'Information costs and the division of labour', as reproduced in Lamberton (ed.), *op. cit.* at pp. 13–24. Authors also emphasise the importance of close connections between firms or between firms and academe; see e.g. Nelson's emphasis on the importance of two-way interaction between applied and basic science (Nelson, *op. cit.*); and also see Johnson *et al.*, *op. cit.*
 23. Roberts, *op. cit.* at p. 102. Roberts says 'the transfer of tacit knowledge over distance requires the movement of people, without which tacit knowledge must be discovered independently' (at p. 103).
 24. Whitley focuses on migration between public and private sector R&D: or in his terms, research primarily undertaken for publication, and other research: R. Whitley, 'Competition and pluralism in the public sciences: the impact of institutional frameworks on the organisation of academic science', *Research Policy*, 32, 6, 2003, pp. 1015–29, at p. 1016. In a rapidly changing research environment, it is crucial for advanced technology firms to be able to 'acquire new skills rapidly' (at p. 1017). Whitley emphasises that what advanced firms need in conditions of 'technical uncertainty' is rapid and flexible access to the requisite skills and knowledge of what he calls 'generic processes and phenomena'.
 25. R. J. Sternberg, J. C. Kaufman and J. E. Pretz, *The Creative Conundrum*, Psychology Press, New York, 2002, define creativity as 'the ability to produce work that is novel (i.e. original, unexpected), high in quality, and appropriate [by which they mean useful, meeting task constraints]' (at p. 1), where they also argue that 'Creativity may be viewed as taking place *in the interaction between persons and their environments*' [italics added], citing some literature to support this. 'Thus the essence of creativity cannot be captured as an intrapersonal variable' (at p. 1). Similarly, for Whitley, *op. cit.* the term innovation is used here to refer to 'public, social and communicative process rather than to a private, intellectual and psychological act' (at p. 294).
 26. Roberts refers to the point made by Nonaka and Takeuchi that it is in the interaction between tacit and codified knowledge that *new knowledge* is created: 'Their [Nonaka and Takeuchi's] dynamic model of knowledge creation is anchored to a social interaction between tacit knowledge and explicit knowledge', Roberts, *op. cit.* at p. 102; citing I. Nonaka and H. Takeuchi,

- The Knowledge-creating Company: How Japanese Companies Create the Dynamics of Innovation*, Oxford University Press, Oxford, 1995.
27. As to the restraint on the sharing of information due to patent-consciousness, see J. Grushcow, 'Measuring secrecy: a cost of the patent system revealed', *The Journal of Legal Studies*, 33, 2004, pp. 59–84.
 28. The negative effects of rigid labour markets on innovation are well recognised. It is clear that in a flexible labour market individuals are motivated to learn about other firms and organisations, which they would not do if nothing was to be gained from it. One of the functions of codification of knowledge and of intellectual property acquisition, is the publication of the firm's knowledge and technological base for the purpose of building reputation and thus attracting productive staff.
 29. For instance, Di Gregorio and Shane observe that university intellectual property policies have a bearing on the question of incentives and the motivation to shift organisations: see D. Di Gregorio and S. Shane, 'Why do some universities generate more start-ups than others', *Research Policy*, 32, 2, 2003, pp. 209–27. Practical issues, such as family, work conditions and economic incentives, naturally affect diffusion of knowledge through personal mobility.
 30. Subramanian points out that '[a] firm provides an employee with access to its critical resource, in order to foster the right kind of firm-specific investments [sic] from the employee. In doing so, however, the firm allows the employee to develop human capital that can be used even outside the firms': see Narayanan Subramanian, 'The economics of intra-preneurial innovation', at <http://people.brandeis.edu/~nsubra/wp/intrap.pdf>. Whether and why start-ups are ever efficient given the loss of complementarity involved is also examined in J. Bankman and R. Gilson, 'Why start-ups?', *Stanford Law Review*, 51, 1999, p. 289.
 31. As Cooper says: 'Intense movement of workers and information suggests a limited capacity of firms to appropriate the gains from their knowledge, leading to under-investment': see D. P. Cooper, 'Innovation and reciprocal externalities: information transmission via job mobility', *Journal of Economic Behaviour and Organization*, 45, 4, 2001, pp. 403–25, at p. 405. Arguably there is a competition between firms and workers: workers try to develop their own knowledge base with a view to benefiting from it in the labour market place, whereas firms want to exploit the knowledge of their workers. As Cooper says: 'The story fits one of workers and firms, where workers invest in human capital and firms invest in techniques to utilize that human capital' (at p. 407).
 32. Cooper focuses on the firm's ability to appropriate the benefits resulting from research, and sees employee mobility as a potential loss: '[w]orkers may exercise de facto property rights by migrating to a higher-paying rival' (Cooper, *op. cit.* at p. 404). His paper 'examine[s] firms' incentives to undertake research activity in a competitive environment where such job mobility is a consistent possibility' (also at p. 404). He makes the point that intensive inventive activity often seems to coexist with 'significant information externalities, of which job mobility is a prominent example' (at p. 404). He asks the question: 'Can the market compensate firms for information lost to the competition through worker-migration?' (at p. 404). He points out that worker mobility conditions '[...] always increase the overall rate of technical progress. As a result, contractual clauses and other means intended to reduce mobility, will generally be welfare decreasing' (at p. 404). Nonetheless we also need to stress the need for firms to control knowledge to some extent, even tacit knowledge. Cooper analyses the concept of spill-over and points out that 'Arrow (1962) recognized worker-mobility as a distinct source of potential spill overs' (at p. 405). But where it comes to worker mobility as a spill-over there are important differences with the traditional notion of spill-over: (1) information only spills to one additional firm rather than globally; (2) the spill-over rate is endogenously determined by the rate of job mobility; and (3) the firm loses some of its knowledge when the worker leaves as it is embodied knowledge: it loses the benefit of that knowledge (all at p. 405).
 33. Or, in other words, there are complementarities between the knowledge of the employee and the other assets of the firm; hence, as Merges points out, inventions of employees are likely to be related to the business, if made with firm resources etc.: see Merges, *op. cit.*
 34. However, see e.g. the *Restraints of Trade Act 1976* (NSW).

35. There are other rules, such as those concerning ownership of inventions, that could be considered relevant as having an impact on employees' knowledge resources, but they are relevant to codified and recorded knowledge as opposed to tacit knowledge.
36. This duty can be seen as an implied term of the contract of employment; see the very comprehensive work by Robert Dean, *The Law of Trade Secrets and Personal Secrets*, Law Book Company, Sydney, 2002.
37. For a recent consideration of these issues see *Victoria University of Technology v Wilson & Ors* [2004] VSC 33 (18 February 2004).
38. Merges refers to an 'escape hatch' by which the law allows employees to leave a firm before an idea is materialised (Merges, *op. cit.*). He says '[...] an employee is in general free to leave a firm, develop an inchoate concept, and enjoy full ownership of the resulting invention. Thus, employee mobility continues to be an important policy informing both trade secret law and the law of ex-employee invention ownership' (at p. 51). See also *Secton Pty Ltd v. Delawood Pty Ltd* (1991) 21 IPR 136.
39. In *Wright v Gasweld* (1991) 22 NSWLR 317 Gleeson, CJ said: 'An employer is not entitled to protect himself against mere competition by a former employee, and the corollary of that is that the employee is entitled to use skill, experience and know-how acquired in the service of the former employer in legitimate competition. It is in the public interest that this should be so. ... At the same time the law will protect trade secrets and confidential information, and will intervene to prevent their misuse'. See also *Kone Elevators Pty Ltd v McNay & Anor* (97001518; NSWSC); and *Stenhouse Australia Ltd v Phillips* [1974] AC 391, 400.
40. See e.g. *AT Poeton Ltd v Michael Ikem Horton* [2001] FSR 169.
41. *Faccenda Chicken Ltd v Fowler* [1987] Ch 117.
42. It may be that in some jurisdictions the courts are more ready to categorise certain kinds of knowledge as 'true' trade secrets or confidential information. But even if there are more successful cases or more cases taken to litigation, they still only represent the tip of the iceberg of tacit knowledge, and are severely constrained as far as legal threshold tests are concerned.
43. See e.g. *GD Searle & Co Ltd v Celltech Ltd* [1982] FSR 92.
44. In *United Indigo Chemical Company Ltd v Robinson* [1931] RPC 178 Bennett J held that it would be almost impossible to restrain the defendant from using 'information he could not help acquiring' (at p. 187). An injunction would restrain him from using his knowledge, skill and experience in the service 'of any one else but the plaintiffs' (at p. 187, quoting from *Herbert Morris*). The key point is that information can be confidential during employment, but not necessarily remain so after employment, a point stressed by Laddie J in *Ocular Sciences*, as pointed out in B. Gray, 'Ocular Sciences: a new vision for the doctrine of breach of confidence?', *Melbourne University Law Review*, 23, 1, 1999, p. 241 ff.
45. In *Printers and Finishers Ltd v Holloway* [1965] RPC 239 at 256 Cross J points out that an employee cannot be restrained by a court of law from using matters he generally recalls about the plant, processes, machinery of his ex-employer. 'Recalling matter of this sort is, to my mind, quite unlike memorising a formula or list of customers or what was said (obviously in confidence) at a particular meeting'. There is nothing wrong with an ex-employee relying on such recall and even if what he recalls was rather particular to the ex-employer's processes and factory, it 'is not readily separable from his general knowledge [...] and his acquired skill [...]' (at p. 256).
46. In *Maggbury Pty Ltd v Hafele Australia Pty Ltd* [2001] HCA 70 (13 December 2001) the judges of the High Court split on the question whether the traditional rule rendering restraints of trade even voluntarily entered into unenforceable should continue to apply today, when there is more equality of bargaining power between better-informed parties.
47. In *Triplex Safety Glass v Scorah* [1937] RPC 21 a contractual clause stipulated that the knowledge that the employee gleaned or discovered 'shall be the exclusive property of the Company'. This was too wide a term and unenforceable (at p. 28). See also *Electrolux v Hudson* [1977] FSR 312; and A. Monotti, 'Who owns my research and teaching materials: my university or me?', *Sydney Law Review*, 19, 4, 1997, p. 425.

48. See *Nordenfeldt v Maxim Nordenfeldt, Guns & Ammunition Co Ltd* [1894] AC 535; and *Herbert Morris Ltd v Saxelby* [1916] 1 AC 688, 715.
49. *Nordenfeldt v Maxim Nordenfeldt Guns & Ammunition Co Ltd* (1894) AC 535, also stands for the exception to the general principle. Partial restraints of trade are enforceable if reasonable, that is '[...] in reference to the interests of the public, so framed and so guarded as to afford adequate protection to the party in whose favour it is imposed, while at the same time it is in no way injurious to the public' (per Lord Macnaghten at p. 565). See also e.g. *Haynes v Doman* [1899] 2 Ch 13, 19 and *Littlewoods Organisation Ltd v Harris* (1977) 1 WLR 1472, 1485.
50. In *Herbert Morris Ltd v Saxelby* [1916] AC 688, Lord Atkinson points out that the employer is '[...] undoubtedly entitled to have his interest in his trade secrets protected, such as secret processes of manufacture which may be of vast value. And that protection may be secured by restraining the employee from divulging these secrets or putting them to his own use' (at p. 702). But his skill and knowledge of his trade or profession he must be able to use: so much benefits him, and is also in the public benefit. Thus a restraint to protect a real trade secret, such as a manufacturing process, is legal, but one which stretches beyond that is not. In *Commercial Plastics v Vincent* (1964) 3 WLR 820, the judgement of the Court (Sellers, Pearson and Salmon LJ) contains the following passage: 'It is clear from the authorities that the plaintiffs were not entitled to impose a restriction which would prevent the defendant from using in competition with the plaintiffs the skills and aptitude and general technical knowledge acquired by him in his employment by the plaintiffs. The restriction has to be justified in this case as being reasonably required for the protection of the plaintiffs' trade secrets by preventing the defendant from disclosing confidential information imparted to him by the plaintiffs in the course of his employment' (at p. 826).
51. In *Brightman* Rich J held the object must be 'to prevent rivals in trade becoming acquainted with the secrets of the internal management of the business and with the names of customers': *Brightman v Lamson Paragon* [1914] 18 CLR 331.
52. See the discussion in *Wright v Gasweld Pty Ltd* (1999) 22 NSWLR 317 Gleeson CJ disagreeing with Kirby P and Samuels JA as to what kind of information can justify the protection of a covenant. For another example, see also *Weldon & CO v. Harbinson* [2000] NSWSC 272 (7 April 2000).