The Valuation of Intellectual Property in Offshoring Decisions

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Executive Summary

Businesses engaging in outsourcing of professional service activities to organizations in foreign countries have focused primarily on the issues of cost and the number of jobs affected. However, significant transfers of intangibles occur in many *service-based* offshoring arrangement as well. Some of these intangibles are considered intellectual property (IP). The transfer of IP that accompanies such offshoring arrangements can have significant value and it is important to understand risks of loss, obligations of taxation, and above all, its contribution to the profit-making potential of an enterprise. Software is an important and often poorly valued component of such IP transfers.

This article does not provide a legal view or an accounting view of value, but considers business-oriented aspects of valuation. Real and intangible assets are the building blocks of a company. While the importance of intangible assets in knowledge-oriented businesses is well established, legal and accounting definitions have not kept pace. For instance, the book value of a company as presented formally virtually ignores intangibles,

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and hence provides little quantitative guidance to the stockholders who are concerned about the future profitability of the enterprise.

After a general introduction that directs the focus to the need to value IP, and technology-based IP in particular, we introduce methods that can be used for valuing such IP. The fact that software is maintained, and hence changes over its life, presents an additional complication. Multiple valuation methodologies applicable to software IP are introduced, and the parameters that are to be estimated are cited. The life of the IP inherent in software is an important parameter in a valuation, and means to assess its life are sketched. Subsequently the complementarities of the methods are discussed.

The specific discussion focuses on IP transferred in the context of offshored services. Several alternatives for hosting IP for off-shore use are presented. With this background, we revisit the motivating issue: why software IP should be valued in general and specifically in the context of offshoring. The article then addresses the question of the barriers and the lack of motivation which causes so many companies involved in the creation and use of software to remain unaware of the value they are creating and exporting. The principal reasons are:
1. Disparate objectives driving the offshoring of professional service activities;
2. Underdeveloped and ambiguous IP valuation techniques, especially for software;
3. Nascent tax regulations governing IP transfer pricing;
4. Offshoring being traditionally perceived as only a transfer of labor.

The cumulative effect of these factors is potentially unreliable estimates of the cost and risks of outsourcing. Since the amount of IP that is transferred abroad can be large, its value should play a significant role in decisions related to offshoring. This problem is exacerbated with offshoring becoming a viable option for smaller companies and the proliferation of global sourcing[1].

Intellectual Property in Modern Enterprises

Intangibles of a business are all assets that are neither physical nor financial objects[2]. In modern knowledge–based enterprises these intangibles are the primary business drivers. The role of these assets is to generate income at a level that exceeds reimbursement from labor expended, use of commodity products, and the margins expected in routine business operations. Owners and stockholders recognize this fact by recognizing a market value of a company as being distinct from its book value, which focuses on tangibles. In 1982, intangibles contributed about 40% of firms' value, but by 2002, 75% of the market value of all US firms was attributable directly to intangibles, while tangible assets accounted for only the remaining 25%[3]. Just like tangible property, intangibles must be continuously maintained and renewed, but at a rate that is roughly twice the rate of

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[1] Smith, H.A. and McKeen, J.D. (2006) "IT in 2010: The Next Frontier" *Management Information Systems Quarterly Executive (MISQE)*, Vol. 5, No. 3, Sep. 2006.

[2] Lev, Baruch (2001): *Intangibles – Management, Measurement, and Reporting;* Brookings Institution Press, Washington, D.C.

[3] Kamiyama, S., Sheehan, J, and Martinez, C. (2006). "Valuation and Exploitation of Intellectual Property." STI Working Paper 2006/5. Statistical Analysis of Science, Technology and Industry. http://www.oecd.org/sti/working-papers

tangible assets[4]. The management of intangibles is hindered by the lack of consistent metrics and the difficulty of identifying the paths from intangibles to profitability.

Intellectual Property (IP) is that subset of intangibles that can be owned by an enterprise. Included are patents, copyrighted documents, trademarks, and documents, software, and related knowledge covered by trade secrets. An important intangible that is excluded from IP assessments is the general knowledge that workers possess; however, enterprise-specific knowledge that is covered by Non-Disclosure Agreements (NDAs) can be considered IP. Employees engaged in innovative work should increase the IP of a business. By exploiting IP companies will gain market share and increase revenue margins. Sharable IP is a bargaining chip for access to complementary technologies – which in turn supports the base objectives[5]. IP is also leveraged in acquiring financing for new ventures. Strategic IP management – the ability to exploit a company's IP to its fullest extent – is becoming increasingly important.

Since most IP, and certainly software, is easy to replicate and transfer, it must be protected. IP that is covered by patents and copyright is identifiable and easier to manage, but such IP is also visible to competitors. To keep IP away from prying eyes, most business and process documentation, as well as software, is protected as trade secrets. Unless an obligation to publish code exists, trade secret protection is common for code. Open-source software is excluded from our definition of IP, but its integration and exploitation within larger systems can add considerable value.

Transferring and sharing IP

IP can be exploited by transferring ited to new settings; it can , open up new international markets, and leveraged by its use leveraged in low labor cost countries[3.] <Your point still is unclear as written. Have I helped the meaning or messed it up with the edit above?>Without transfer of IP from the sponsoring originators to the users most offshoring[6] projects would not be feasible; even a simple service project as a call center derives its capabilities to a large extent to the IP that is being provided[7]. In more complex arrangements, say cross-border development and licensing of software, the need to manage a company's IP becomes crucial. In those cases concerns about allocation, security, and taxation arise.

While offshoring of jobs now permeates the economies of developed and developing countries, the effect of providing IP created originally by offshoring sponsors to their offshore service companies may greatly exceed the long-range economic effect of job transfers to those offshore service providers[8]. As relationships with offshore entities grow, new IP is created. In a global setup major foreign entities may both be users of the IP and contributors to IP. The ownership of prior and new IP depends on the contractual

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arrangements between the sponsor and the service providers who use that IP. With multiple participants segregating IP by the locale of its origination, and then charging for the use of the IP can easily become complex.

A common, simplifying approach is to set up a hosting company to hold the rights to all IP relevant to the offshoring agreement, as shown in Figure 1. Such a host is typically a business unit fully controlled by the sponsor. The only role of the host is to receive and distribute income generated by the IP it holds and to pay all costs for further IP creation. The actual expenses incurred by the sponsor's and the service provider's R&D efforts are reimbursed by the host, and ownership of all new IP also accrues to the host. The host holding the IP also garners the benefits of using that IP, as a share of revenues from products and services being sold that use that IP. Those benefits can be collected either as royalties for use of the IP or as a share of the income from sales at the user sites.

Figure 1: Participants in IP creation and consumption
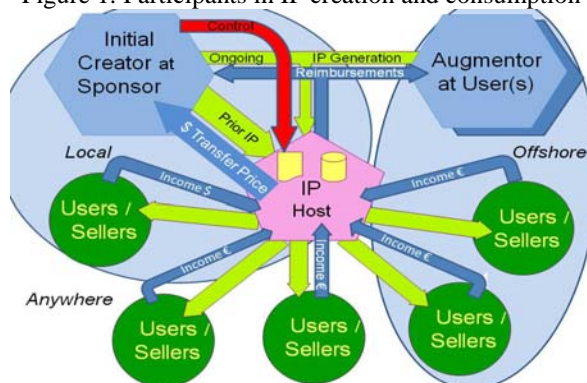
If a product is augmented in a locale specifically for use in its own region, then both those costs and the specific benefits should be assigned solely to the participant in that region.

Note that IP can flow to any place where sales can be made and profits can be accumulated. For our discussion, the difference between nearshoring and global offshoring is of little concern, since the management of IP becomes a greater concern as soon as the IP is available at sites where laws, regulations, taxation, and attitudes concerning intellectual property differ. The operational benefits of being geographically close remain valuable.

As smaller companies participate in offshoring, and as communications technology makes offshoring attractive for complex projects in large companies, IP is being transferred across borders more often than ever before in history. Issues of IP management are thus becoming a broader concern to business decision makers.

Why Assign Value to IP?

The overriding reason for being able to assign a value to corporate intellectual property is the need to understand one's business in quantitative terms and to optimize use and maintenance of IP to the firm's utmost advantage. There are also specific situations where valuations of

IP are required. Assigning a value to IP is crucial when setting prices for IP, when determining royalty rates for shared IP, to obtain financing, or as a contribution in a joint venture. The value of offshored IP is needed to quantify risks because of its availability in locales where legal protection and social structures differ. If the offshore entity operates at arms-length, then a transfer price must be established as well, since such a transfer is regarded as an export[9]. Transfer pricing of tangibles is well established, but transfer of intangibles introduces flexibilities and alternate valuation requirements. Figure 2 indicates the participants, the similarities, and the distinctions when exporting tangible versus intangible property.

Figure 2: Distinctions when exporting tangible versus intangible property.
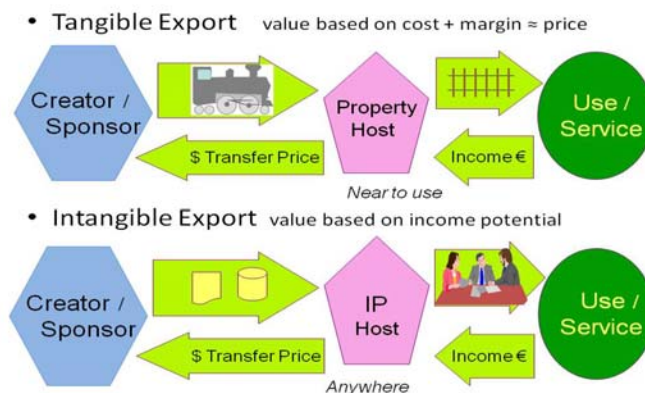
Companies are not the only organizations concerned with IP valuation; governments in many countries are losing billions of dollars of taxes due to inadequate transfer pricing estimates in offshore parent-subsidiary relationships [10].

The role of Technology-Based IP

For accounting purposes, the Financial Accounting Standards Board (FASB) defines technology-based IP as *patented technology, trade secrets, databases, mask works, software, and unpatented technology*. By focusing on technology we ignore in this paper the value of the reputation of a company, its general trademarks, and the management contribution. These elements are harder to allocate than technology that is being transferred. We also exclude the value of existing customer loyalty.

The contribution of software to IP

Computer software can generate profit by being replicated and sold as products to external parties, and by leveraging internal business processes. Product software comprises operating systems, compilers, database systems, common desktop productivity tools, applications for creative artists, games, and a myriad of other applications. Software used as part of internal Information Technology (IT) can be used to design

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[9] Rosenberg, Joel B. Barbara N. McLennan: "Technology, Licensing, and Economic Issues in Transfer pricing"; Chapter B in Robert Feinschreiber: *Transfer Pricing Handbook*, 3rd edition; Transfer Pricing Consortium, John Wiley Publishers, 2002 supplement.
[10] Martinson, O.B., Englebrecht, T.D., and Mitchell, C. (1999). "How multinational firms can profit from sophisticated transfer pricing strategies"; *Journal of Corporate Accounting & Finance*, Vol. 10, No. 2, pp. 91-103.

products, manage inventory and supply chains, handle finances and payroll, support sales and call centers, and provide feedback from the field to correct and improve products[11]. Companies that develop and market software or products that embody software to external customers see the effects of their investment in IP directly, but it is hard to find an enterprise that does not have some proprietary items of software IP used internally.

Overall, despite massive levels of investment in software and information technology (IT) assets, alignment of technology assets with business functions and benefits remains a difficult task[12]. The ubiquitous use of IT and the extent to which it drives the profits of many of today's corporations notwithstanding, the value-generating capabilities of software and other intangibles are easily overlooked, so that attention is focused on expensing and thus minimizing these items[13].

Without having quantified the benefits of internal IT investment, simple measures for making business decisions become distorted. A reduction of spending on IP investments is easier to assess than the benefits generated by IP investments[14]. A reason for this imbalance is that U.S. accounting regulations disallow the capitalization of costs related to internally-developed intangible assets, allowing only for capitalization of certain development costs related to software to be marketed. This effectively expenses *any and all* costs attributable to software to be used in house.

Even for software to be marketed, capitalization of development costs is allowed only during the period starting when that software is deemed 'technologically feasible' and ending with the release of the new software product to customers. The term "technological feasibility" is ambiguous and depends on management's philosophy and judgment. Therefore, it is relatively easy for maximization of expensing of software development costs to occur, contributing to the inability to view software as a value-creating asset[15].

While capitalization makes the costs of software development visible, it does not replace valuation of software IP. Even substantial software development costs have no direct relationship to the benefits that the software may create. A company can spend large amounts on, say, administrative software that might seem essential, but will not alter corporate revenues. But a modest project that allows the company to enter new markets can have a major effect on corporate fortunes.

Technology-Based IP in offshoring

While many types of IP are transferred across country borders in offshoring arrangements we focus now on technology-based IP. Since software is essentially codified knowledge,

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[11] Thornton, E.A. (2002). "Valuation of Software Intangible Assets." *ASA International Conference*. San Diego, CA. August.

[12] Kohli, R. and Devaraj, S. (2004) "Realizing the Business Value of Information Technology Investments: An Organizational Process"; *Management Information Systems Quarterly Executive (MISQE)*, Vol. 3, No. 1, March, 2004.

[13] Kwan Yuk, P. and Stafford, P. (2007). "Study Urges IT Valuation Rethink"; *The Financial Times*, Nov. 4, 2007. Obtained from FT.com.

[14] Peppard, J. and Daniel, E. (2007) "Managing the Realization of Business Benefits from IT Investments" *Management Information Systems Quarterly Executive (MISQE)*; Vol. 6, No. 1, March, 2007.

[15] Mulford, C. and Roberts, J. (2006). "Capitalization of Software Development Costs: A Survey of Accounting Practices in the Software Industry," May, 2006.

much technology-based IP falls within the broad definition of software. Offshored software IP is commonly used in applications such as: call centers, offshored production or operational settings, software maintenance[16], software adaptation to international standards, software localization to specific languages and regions, software creation, and web services.

Examples of software-based IP for immediate use are: user guides; proprietary binary software for use in the host operation, embedded databases, documentation on problem resolution based on prior experience, trademark registration and patents for embedded concepts. If the software is to be the basis for further development more material is required: design specifications, source codes, process descriptions guiding further development; and instructions that provide an understanding not obvious from primary documentation. Again, such documents and computer files that are transmitted under confidence are considered IP. If the host also resells the products in the foreign geographical area, then the rights to use established trademarks, literature that describes the products for the customers, business methods that make sales of the product effective, instructions on exploiting these business methods, and the lists of prior customers and their contracts are all part of the software IP.

Principles of IP Valuation

Valuation is the process of establishing a fair price for a good or service. When tangible goods are transferred to a host for their use, a price for the good is usually already established, giving both parties and regulators guidance about the value of goods being transferred. For software, off-the-shelf marketable packages have similar characteristics. But a master software disk, containing software to be replicated, cannot be valued by a unit price. Its value will largely depend on the future sales of its contents. The contents represent the IP to be valued. The cost of generating the contents, as long as it can be protected, does not determine its value. Case in point: while a thousand lines of code that generate a report that nobody reads have little value, a few brilliant lines of code can make a company profitable.

Marketed Software

Intangibles must be valued by their contribution to the future income of a business. More specifically, the value of IP for software being sold is estimated by a forecast of revenue from its future use, minus the cost incurred in providing the software. Software products are easy to reproduce at a cost that is negligible. Its distribution is relatively simple and can even occur over the Internet. Even at a competitive price each incremental sale garners much more profit than the incremental cost of production. If a product has a marketing history, its ongoing sales in a foreign region can be estimated.

Embedded Software

Low replication costs also apply to the software that is embedded in so many of seemingly tangible products, from mobile phones to aircraft. The allocation of income to software versus the remaining product IP is a difficult issue. Some of our subsequent

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[16] Basili, V. (1990). Viewing Maintenance as Reuse-Oriented Software Development. *IEEE Software,* 7(1), 19-25.

metrics also fail to capture the IP of embedded software adequately. Although the potential value in the global market is great, and off-shoring is common, we will not try to analyze this market segment now.

Internal use software

Many businesses depend on internally generated software that is created in house or made to order by a vendor. The value of IP can also not be based upon its development cost. The income from business operations now has to be allocated to the software versus other costs of doing business. Due to the ubiquitous effect of software on the supporting processes of a company it is easiest to take a global approach. Contributions to income also derive from investments in creative people and machinery. In such a joint contribution scenario, income attributable to software can be fairly assigned based on the assumption that the management of a company is rational in the allocation of its resources[17]. If such optimality is assumed, corporate net income created by diverse expenses can be allocated according to the proportion of the costs incurred. Since the fraction spent on software from year to year will vary, the allocation of income is should be made based on long-term expense ratios, in order to even out variations over the life of the software.

Assigning Value to Software

Software presents a unique problem in valuation: In order to ensure its continued usefulness and applicability, software must be periodically updated so that it remains current. Maintenance costs comprise between 60 and 80% of software R&D expenses in mature companies, amounting to around 15% of the prior development and maintenance costs[18]. The effect is that software is *slithery*; that is, it is always changing via maintenance efforts.

The purchaser of software will only be indirectly aware of the changes that software undergoes. However, many purchasers are aware that, unless they have a maintenance contract, they will have to buy a new version of the software every three or five years, since the previous version will become obsolete. Such obsolescence comes about not because the installed software has changed, but because related technology and performance expectations change. Much software must also be updated when business rules, accounting standards, and taxation methods change. With the changes in code come requirements for documentation updates. Note that new editions of technical books exhibit a similar renewal cost.

It is clear that the flexibility that software brings to systems has its costs. Valuation approaches to be employed must be able to deal with the slithery software.

Multiple IP valuation methods are available to practitioners. Of the methods selected below, one or more may be appropriate for a given situation, and must be chosen given the facts and circumstances applicable to each case:

Direct Assessment of Future Income: The determination of future income requires estimating the income accruing to the IP in each of all future years over its useful life,

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[17] Samuelson, P.A. (1983). *Foundations of Economic Analysis*: Harvard University Press, 1947.
[18] Glass, Robert L. (2003): *Facts and Fallacies of Software Engineering*; Addison Wesley, 2003.

i.e., the amount sold and the net income per unit after routine sales and distribution costs are deducted. If the IP is used internally, then the savings accrued by owning the IP can be similarly estimated.

The estimation of the IP value of marketed software requires estimates of sales volumes over its life; estimates at the unit product level, as the sale price, sales and distribution overhead; and estimates that pertain to the product line, as marketing costs, future version frequencies, and maintenance cost expectations over the software life. These estimates can be based on prior experience with the product, or on experience gained with similar products. When offshoring operations of an existing or similar product, prior data will be available, and estimates will be reliable. Published information to complement internal experience is sparse, although sales trends of competitive products may be found in competitors' documentation and stockholder reports, and in research reports of industry analysts.

The unit price for successful software products tends to be stable, even when later versions have more features. Data on sales volume expectations of consumer products have been modeled using Erlang distributions[19]. The sales curve in the sample graph of Figure 3 represents an Erlang parameter of 12, appropriate for products that take some time to penetrate the marketplace. Smaller Erlang parameters describe more rapid product acceptances. An appropriate Erlang parameter can be computed based on sales experience with similar products, or estimated given data on initial sales behavior and an estimate of product lifetime.

When software is made available with maintenance contracts a second income stream is available, also shown in Figure 3. The quantity of products under maintenance increases over the product life, contributing steady income. Such maintenance income can exceed sales income over time[20].

Figure 3: Income streams for a software company that charges maintenance fees.

Software that is sold as shrink-wrapped products is also maintained, but the periodic issuance of versions superimposes a periodic jiggle on the sales curve. Figure 4 sketches

[19] Chatfield, C. and G.J. Goodhardt (1973): A Consumer Purchasing Model with Erlang Interpurchase times; *Journal of the American Statistical Association*, Dec 1973, Vol. 68, pages 828-835.
[20] Michael A. Cusumano: *The Business of Software;* Free Press, 2004

the shape of such a jiggle, assuming a two-year version release interval. Once an estimator is aware of such a behavior, a long-term revenue pattern can be generated.

Figure 4. Effect on sales due to version releases.
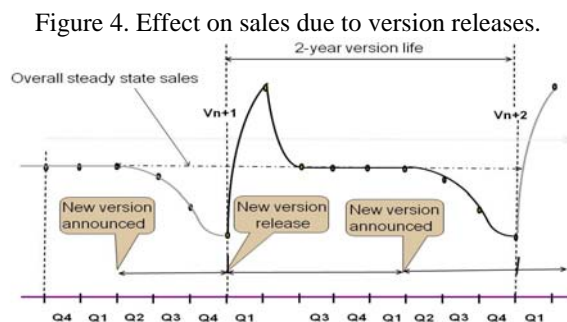
The future revenue profile of truly novel software is uncertain, and hard to quantify, but it is still important to make the estimates needed for a valuation[21]. If expectations are not met, a business can make adjustments to prices and investments. Without documented expectations, delays in recognizing problems will be common and necessary business decisions will be delayed.

The other parameters needed to complete an income estimate are not very product specific, and can be estimated based on corporate or related business experience. Sales costs can easily take 50% of revenue. Version frequencies must balance keeping the software product up-to-date while not annoying customers excessively. Maintenance costs were addressed earlier, but are based on the prior software investment, while maintenance revenues, also often 15%, but of the original sales price, apply to all software units that are under maintenance contracts.

Research and Development (R&D) Spill-Over: This valuation method computes the expected income by relying on the leverage of R&D expenses, aggregated over multiple years. The method employs three key parameters: annual investments in R&D, the period that such an investment will contribute to future income, and the leverage ratio of R&D investments on future corporate income. Published economic benefits of R&D investments vary greatly, so that assigning such a ratio to specific R&D induces much uncertainty[22]. Determining the start and end of life of R&D benefits is also difficult. Early, high risk R&D investments should have a longer life than investments in short-range product alterations. R&D life values of about seven years have been cited, but these are based on an unanalyzed mix of R&D activities [23]. The R&D spillover approach is also hindered because U.S. accounting practice causes software development and maintenance costs to be lumped together as R&D costs[24]. Unless the R&D components are broken down, a valuation based on R&D spillover method is unreliable for specific software under development. For established companies, where maintenance is the major component and profit margins are stable, R&D spillover can provide useful guidance.

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[21] Laurie, R. (2004). "IP Valuation: Magic or Myth?" *Intellectual Property Issues in M&A Transactions*. April.
[22] Leonard, Gregory and Lauren Stiroh (editors), (2005): *Economic Approaches to Intellectual Property Policy, Litigation, and Management*; National Economic Research Associates (NERA), White Plains, NY.
[23] Grilliches, Z. (1984): *R&D, Patents, and Productivity*; Univ. of Chicago Press.
[24] Lev, B., (2001). *Intangibles, Management, Measurement and Reporting*; Brookings Institution Press.

Real Options (RO) Valuation: For software and other intangibles that have future income generating ability, but which are currently yielding zero or negative returns, real options (RO) valuation is an alternative. Based on the Black-Sholes stock option valuation methodology, RO views investment in IP as an option to develop the current asset depending on the facts and circumstances at option dates. Dates to be considered would be key development, product release, and profitability milestones. This method still requires an income-based valuation, but adds the optional value of flexibility in spending or cancelling R&D costs associated with development[25]. A drawback is the myriad of variables inherent in options pricing, leading to heightened risk of improper valuation and pricing audits, especially for options not in the public view and marketplace[26]. The relative value of options in the overall financial picture of a corporation is hard to assess in a company with a mix of activities. Divulging specific information to outsiders regarding optional plans for future expansion or cancellation of projects is very unattractive to management[27]. RO-based valuations are hence mainly restricted to analyses performed internally or by informed and trusted experts.

Market Capitalization: Subtracting a company's book value from its total market capitalization gives a 'market worth' of the company's intangible assets based on the stockholders assessment of future income. Such an estimate is already discounted for perceived risks. The value of intangibles that are not related to software must be subtracted as well: management expertise, the value of the workforce that cannot be protected by non-disclosure arrangements, and corporate trademarks that are not related to software.

The portion of the market value allocable to software can be substantial; consider the hypothetical case if all proprietary software were to disappear. If the software to be valued is only a part of the companies' products, then a further allocation must be made. A split by sales volume becomes invalid when the products being assessed differ substantially in type and market from the items being excluded from the transfer. This top-down approach implies that shareholders have more wisdom relevant to future income than analysts who aggregate corporate IP values bottom up. To what extent internals primarily known to management are valued by stock analysts and shareholders is uncertain[28].

Estimating Software Life

All software valuation methods depend critically on the expected life of software. Software is maintained throughout its life, much more so than tangible items. The effect of ongoing maintenance is that software can have a very long life, much longer than the equipment used to execute the software. In that sense software life is similar to that of a

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[25] John Dahlgren: Real Options & Value Driven Design in Spiral Development; MITRE report 06-0493, March 2006.

[26] Damodaran, A. (2006). Dealing with Intangibles: Valuing Brand Names, Flexibility and Patents; Working Paper, *Stern School of Business Reports*,. Jan. 2006.

[27] Damodaran, A. (2005). The Promise and Peril of Real Options; Working Paper S-DRP-05-02, *Stern School of Business Reports*, July 2005.

[28] Quick, Perry D., Timothy L. Day, Brian J. Cody, and Susan R. Fickling (2005): Using the Market Capitalization Method To Value Buy-Ins: Beware of 'Thing Three', *Transfer Pricing Report*, Vol.14 No. 02 July 2005.

trademark, which can be maintained indefinitely, until its renewal no longer makes sense because of external business conditions[29]. A corollary effect of that maintenance is that the software changes greatly over that long life, so that the product being valued at one time differs greatly from the product at a later time. The improvements of contents must be reflected when applying valuation models[30].

Limits to software life can be external or internal. External factors are competition, often enabled by not maintaining the software adequately, or obsolescence due to new business concepts. A current example is the move to web services from client-server models. As of the date of this article, the sales lifetime of the client-server concept is 16 years, the value used in Figure 3, but given the rate of replacement, client-server software will continue to create income for many years to come.

The ever-increasing maintenance costs of software impose an internal limit on software life. When the cost of maintenance exceeds the income attributable to the software, the effective life of software, as well as its contribution to IP value, ends[31].

Over a software life of about 16 years, there may be 8 significant version releases, more initially, fewer later in its life. Software that has significant dependencies to external conditions, as SEC, IRS, etc., regulations will require more frequent updates.

Discounting Future Income

For valuation all forecasts are discounted to a net present value. Such discounting lessens the effect of errors of estimating into a far away future. Less mature products will be subject to a higher discount rate than products or internal use software that is well established. Mature software will have less risk associated with offshoring <its maintenance?>, as it will be time-tested; these risks will be reflected in a lower cost of funds needed by the host for obtaining the IP rights. Risks are still present, however. Discount rates for software investments vary widely around 20%, but can be narrowed for a specific sponsor, product, and IP host.

Combining valuations

More confidence is gained if several methods produce similar results. An estimation of R&D Spill-over can complement a valuation based on an estimation of future income. Essentially, R&D Spill-over measures the input to the IP generation process, and income-based methods estimate the results. Market-based valuations include common perceived risks, but not any opportunities or risks that have not been disclosed by corporate management. Option recognition can help when assessing differences between income-based methods and market based valuations.

Options can also be used to assess the value of opportunities and risks engendered by expanded offshoring arrangements, which are likely beyond expectations used in other valuation methods. There is also an option value associated with maintenance expenses,

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[29] Gordon Smith and Russell Parr (2005): *Intellectual Property: Valuation, Exploitation, and Infringement Damages*, Fourth Edition; Wiley, 2005.

[30] Wiederhold, G. (2006). "What is Your Software Worth?" *Communications of the ACM*, 49 (9), 65-75.

[31] Spolsky, J. (2004). *Joel on Software*. Apress.

since costly renewal of IP can be reduced when expectations of software lifetime are threatened by external factors, as new computational paradigms or competing products.

In addition to the methods listed, segments of IT-based IP can be measured in terms of specific objectives, as 'for efficiency' or 'for knowledge management', each of which has different payoffs and thus suggests the use of different valuation techniques[32].

Software IP in Offshoring

Software that has been transferred offshore for a fair transfer price will also require ongoing refreshment of IP in order to maintain the full value of the software, as was already indicated in Figure 1. Income projections assume that maintenance will be performed, which now must be supported by the new host. Such an arrangement is formalized as a `cost-sharing agreement'. Maintenance may be performed by the sponsor and by the host, but for simplicity we assume that all maintenance is paid for by a shared pool. Contributions to that pool may be proportional to the benefits that the sponsor and the host garner, likely based on income attributed to the software IP. <<have some later words already on cost sharing, but not found>>

The Contribution of Maintenance to IP

In order to deal with offshoring of IP, we must consider the valuation of the software at the time of transfer and the value contributed subsequently by maintenance. To simplify the discussion we consider here unit product costs and revenues, ignoring sales volume variation. As observed earlier, the price of a unit of well-maintained software tends to be stable through most of its life. A steady rate of maintenance will diminish the relative contribution of the prior IP, transferred when the offshoring arrangement commenced, versus the ongoing contributions of IP, both shown in Figure 1. One approach to measure the relative contributions is by their cost relationship. Then, after several years the aggregated maintenance costs have become equal to the original cost of development, so that relative contribution of the original IP has been diminished to 50%, as shown in Figure 5.

Figure 5: Diminution of the value of the original IP contribution in software.
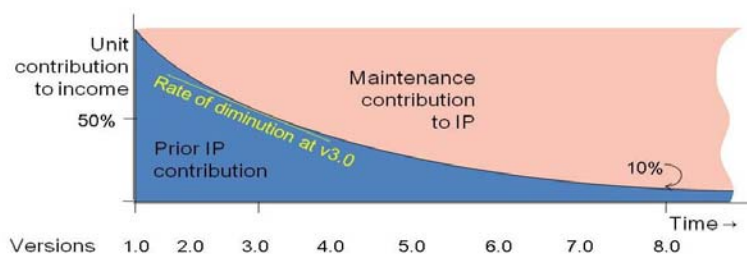
While the software in total has an indefinite life, the contribution of the original prior transferred software transferred reduces steadily. For estimating value of transferred software IP it is best to impose a limit. A practical limit to life of the transferred software

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[32] Kwon, D. and Watts, S. (2006), "IT Valuation in Turbulent Times." The *Journal of Strategic Information Systems*. Vol. 15, Issue 4 pp 327-354.

IP is set when the original contribution becomes less than 10%, also indicated in Figure 5.

Measuring Diminution

Software maintenance can be measured in several ways. One metric is the relative investment input to development and maintenance, discounted up or down to the date of the IP transfer, as well as projected subsequent maintenance costs. As already noted for the R&D spill over method, often the historical costs are not well documented and cannot be effectively allocated to a specific software project[33]. An alternative metric is to consider the output in terms of the volume of code that has been generated. Early investments should be valued highly, both from an intellectual point-of-view and from the financial view as having had a long and risky investment lag. The alternative, the well-documented, functional metric of lines-of-code (LoC), is the simplest and easiest to use[34]. Old code provided the essential functionality for initial purchasers, but also becomes well known and easily replicated; new code adds new value and keeps competitors at bay.

A transfer of mature software, say the third version release, will experience a lower rate of future diminution than the initial release of the software, as sketched in Figure 5. But now the initial contribution includes the maintenance effort up to that Version 3, and will be included in the initial contribution when computing relative contribution due to subsequent maintenance efforts. Transfer of mature software is actually typical for offshoring initiatives, since during initial development software creators traditional give little thought to outsourcing or offshoring possibilities. Only when software is successful and call center and maintenance demands subsequently grow, that outsourcing is considered.

Recently concurrent development of original software using globally distributed teams has become popular[35]. Then the initial contribution will be absent or small, and all or most IP generation is due to joint ongoing efforts. The use of a host company to hold all the IP being generated, pay for all efforts, and collect the benefits from that IP simplifies keeping track of IP in such arrangements.

Alternative Offshore Hosting Arrangements

When a sponsor company outsources work to a service organization, the user requires access to IP from the sponsor, in essence becoming a *consumer* of IP. If a user only consumes IP, then licensing is appropriate. IP licensing activity has grown significantly in recent years. In 2004 licensing receipts for patents alone totaled $110 billion, up from just $10 billion in 1984[36].

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[33] Mulford, Charles W., and Jack Roberts: Capitalization of Software Development Costs: A Survey of Accounting Practices in the Software Industry; College of Management, Financial Analysis Lab., Georgia Tech., May, 2006.

[34] Jones, C.T. (1998). *Estimating Software Costs*; McGraw-Hill.

[35] Gupta, A. and Seshasai, S. (2007). "24-Hour Knowledge Factory: Using Internet Technology to Leverage Spatial and Temporal Separations." *ACM Transaction on Internet Technology (TOIT).* Vol. 7, No. 3, 2007.

[36] Arora, A. (2005), "Patents: Who Uses Them, for What and What Are They Worth?" presentation at EPO-OECD-BMWA International Conference on Intellectual Property as an Economic Asset: Key Issues in Valuation and Exploitation, 30 June-1 July 2005, Berlin, www.oecd.org/sti/ipr.)

We consider only cases where the users of the IP are foreign relative to the sponsor.

Three distinct approaches to obtaining offshored services are common:

1. Establishing an operation wholly under the sponsor's corporate umbrella, a Corporate Offshore Operation (COO). All IP, control, and financial reporting is integrated with the sponsor company.
2. Outsourcing to an independent foreign host. Such a host is termed an Independent Foreign Company (IFC);
3. Outsourcing to an exclusive new corporate entity, owned by the sponsor. The host in this case is termed a Controlled Foreign Corporation (CFC).

The distinctions are important from the viewpoint of protection of intellectual property.

Offshore Operations structured as a COO

Merely establishing an offshore operation can provide benefits in terms of labor costs to a corporation, adding some communication and management costs. In terms of exposure of IP the situation differs little from domestic outsourcing. Local laws and conventions must be adhered to, and some constraints on ownership may apply. Such a COO does not operate at `arms-length' and the valuation issues associated with transfer pricing do not arise. We will not discuss this alternative further in this paper.

Operations Contracted to an IFC

To avoid the costs and complexities with running an offshore operation, it can be advantageous to contract for the needed services with an existing foreign company, an IFC. In this arrangement no transfer of owned IP need to be made, but access to needed IP must be granted. The sponsors will reimburse the unrelated IFCs for IP-generating efforts they provide for them. By 2005 the overall international trade balance of IP licensing transactions between sponsors and Independent Foreign Companies (IFCs) accounted for more than 40% of all international transactions between unrelated companies, double the extent of just five years prior[37].

If the IFC also markets products or services to others based on the sponsor's IP, then more complex licensing agreements can be used. Royalty payments or a commission in connection with sales or services are paid for income-producing use of that IP. This alternative is shown as the top choice in Figure 6. Royalty rates ideally should match expected income flow from each item of IP being offshored. Royalties consist of payment for IP use and for house maintenance costs; product improvements are made at no extra charge. Usually, software is maintained at the parent company site; however, any offshore maintenance work can be reimbursed by the sponsor, which has the effect of keeping the IP wholly owned by the parent. The structure of offshoring contracts, however, has an effect on the amount of rework needed within the development cycle;

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[37] Kamiyama, S., Sheehan, J, and Martinez, C. (2006): "Valuation and Exploitation of Intellectual Property"; STI Working Paper 2006/5, Statistical Analysis of Science, Technology and Industry. http://www.oecd.org/sti/working-papers

this can add to or detract from future software maintenance needs: for example, fixed fee contracts tend to result in less rework[38].

If the IP needed at the IFC is substantial, a formal transfer of IP to an IFC can become desirable. The IFC then becomes a host for that IP, or for a share of that IP. Costs for maintaining that IP are paid locally, and benefits for the use of that IP accrue locally as well. Motivations to host IP at the IFC include intellectual participation and sheltering of foreign income from taxation by not transmitting that income to the sponsor. This alternative is presented as the bottom choice in Figure 6.

Figure 6. Two alternative IP locations for IFC use of IP.
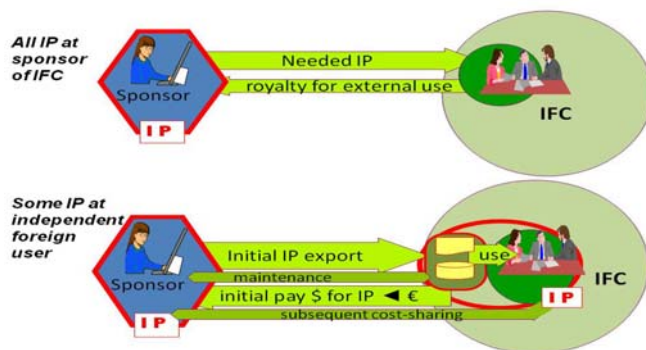
When contracting business out to independent IFCs, the choices of how to structure IP transfers, transactions, and remunerations must be set contractually[39]. In particular, sponsors and service providers should "make intellectual property issues transparent at the contract stage, and arrive at precise agreements about what is and is not allowable, at what price, and what penalties arise from non-compliance with agreements or misappropriation of knowledge"[40]. Recent literature has focused on optimal structures of contracts between sponsors and service providers; for example, time-and-materials contracts, while not efficient when considering the information known during the contract structure phase of development, tend to bring in higher revenues for vendors rather than their sponsors[41].

An IFC serving multiple sponsors must sequester each sponsors' IP carefully to avoid risks of loss due to inadvertent intermingling of IP. Many IFCs pride themselves on the secure manner with which they protect the owners' intellectual property, but IP providers still have some reasons to be concerned. The employees of an IFC are likely to work on more than one contract. The loyalty of employees of an IFC will be primarily to their

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[38] Gopal, A., Mukhopadhyay, T., Krishnan, M.S. and Goldenson, D. (2002). "The Role of Communication and Processes in Offshore Software Development" *Communications of the ACM*, Vol. 45, No.4, pp. 193-200. April 2002.

[39] Ranganathan, C. and Balaji, S. (2007): "Critical Capabilities for Offshore Outsourcing of Information Systems"; *Management Information Systems Quarterly Executive (MISQE)*, vol. 6 no.3, Sep. 2007.

[40] Oshri, I., Kotlarsky, J. and Willcocks L. (2007): "Managing Dispersed Expertise in IT Offshore Outsourcing: Lessons for Tata Consultancy Services"; *Management Information Systems Quarterly Executive (MISQE)*, vol. 6 no. 2, June 2007.

[41] Gopal, A., Mukhopadhyay, T., Krishnan, M .S., and Sivaramakrishnan, K. (2003). "Contracts in Offshore Software Development: An Empirical Analysis"; *Management Science*, vol. 49, no.12, pp. 1671-1683. 2003.

employer, rather than to the owners of the intellectual property. Even when documents are protected, it may be difficult to protect the underlying concepts. Software development methods in particular are difficult to strictly sequester in an IFC host setting, though a number of vendors claim that they are developing approaches to achieve such isolation.

Sponsor-Owned CFC Operations

When the operations to be offshored are major, the preferred approach is to set up a captive entity to provide the services. This is done through the establishment of a foreign subsidiary in which the sponsor has a majority stake, a Controlled Foreign Corporation (CFC). Even though CFCs are subject to local laws and standards, the control provided by ownership and authority over a CFC's operations is stronger than the contractual strictures that govern an IFC relationship.

Employees at a CFC work within the sponsor's umbrella, and their individual contributions can be recognized. Work done at a CFC is easier to monitor, and if managed well, the foreign employees should be as loyal as those at the sponsor site. All employees of the CFC will have access to the sponsor's IP and the can get assistance, when needed, from the sponsor's staff. CFCs can also provide complementary benefits to a parent company; a CFC can function as a marketing and sales center for particular geographic and language areas; it can garner feedback from local constituents; and it can adapt products and marketing techniques to local conventions.

The CFC option does require a substantial initial capital requirement, and can lead the company to deviate from core competencies. In distinction with a simple OOC, CFCs must keep their own books, and transfer costs or profits as stipulated by legal conventions and contracts. Once a CFC is established, however, sharing and cooperation becomes easier. When providing IP from a generating sponsor to a consuming CFC, three alternatives are possible, as shown in Figure 7.

Figure 7: Alternate locations for IP used at a CFC
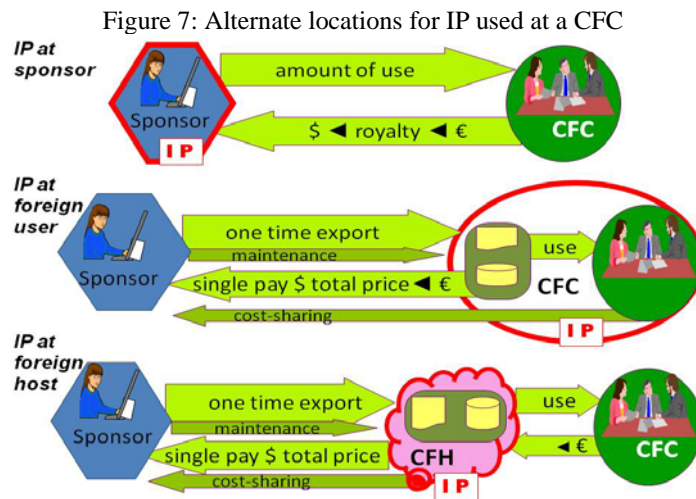
Location alternatives for IP for a CFC

Again the formal ownership of the IP can remain at the sponsor and remuneration for use will be in the form of royalties or commissions, shown as the first alternative in Figure 7.

A second alternative structure is an investment by the CFC in importing and hosting the required software IP, as shown in the middle diagram of Figure 7. The CFC pays the transfer price for the imported IP. The fraction of IP to be transferred from the sponsor to the CFC can be based the relative percentage of foreign sales. As an example: if 25% of the owner's products are sold via the CFC, the fraction to be transferred is 25% of the total relevant IP involved in these sales efforts. This fraction does not split the IP, it is just a contractual allocation. Subsequently, maintenance costs for the IP will be cost shared between the CFC and the sponsor in the same ratio. If the CFC participates in maintaining the software the CFC will receive reimbursement from the cost-sharing payments received by the sponsor.

The third alternative in Figure 7 involves three parties: the sponsor company, its CFC, and a Controlled Foreign Holding (CFH) company. An appropriate fraction of the sponsor's IP will be transferred to the CFH, and the CFH will start being indebted to the sponsor for the value of that IP. The end-consumer of the IP – the CFC – now pays royalties to the interposed CFH. The CFH will reimburse the maintenance costs, and can then repatriate profits and losses to the sponsor. Profits not needed for the sponsors operation can be accumulated at the CFH, initially reducing the indebtedness, and subsequently be held for new initiatives. In this structure, a CFH is often strategically placed in a low or no tax locale, reducing the tax burden for the sponsor. If the CFH requires high royalty rates from the CFC, the profitability of the CFC will be reduced. Now income taxes paid to the country where the CFC is located will be low. The combined effect is that taxes commensurate with IP contributions will not be paid to the authorities in countries of both the parent company and the CFC. The overall profitability for the consolidated entity will be large.

There is of course a significant cost associated with setting up and maintaining a CFH. The CFH option is hence mainly available to large enterprises. Financial service companies will minimize the costs of maintaining a CFH by sharing managed foreign facilities with many sponsors.

Considerations

We have now described the many alternatives for managing software and related IP when offshoring operations. We can now revisit the questions raised initially: *Why should companies make the effort to assess the value of the IP embedded in their software?*

Understanding contributions to market value

Consider a software company whose essential value depends on the IP incorporated in its products. Its market capitalization – the number of shares outstanding multiplied by the prevailing value of each share held by the public – is an external estimate of its total corporate value. But market capitalization tends to fluctuate. Relying on book values is also clearly inadequate. For businesses operating in knowledge-intensive industries,

intangibles can account for over 97% of all assets[42]. For all public companies put together intangibles amount to over two-thirds of their $7 trillion collective market value.

Knowing the value of the income-producing components of its business helps management understand what it can control: its products, the marketing of its products, etc., versus the elements outside of its control: the market itself and perceptions about the position of the company in the market. This reasoning also holds true for companies in other economic sectors, from finance to manufacturing. Most modern businesses depend to some extent on software for generation of revenue. Determining if the contribution provided by IT and the software used internally is substantial or not will allow setting of focus. An informed manager and investor can better drive overall stock price valuation[43]. When substantial investments in IT are needed management may have to bring the evidence to its board of directors, since few board members will be knowledgeable outside of the company's apparent primary product line or finance.

Valuation for Transactions

Most major transactions, as acquisitions, long term supplier or distributor contracts, outsourcing, etc., involve IP. Establishing a purchase price, royalty rate, or transfer price is best done on a consistent basis, rather than on a case by case assessment, often provided by outside advisors who have unknown experiences and prejudices. Similarly, when seeking financing a solvency opinion may be required, to assure that debts will not be excessive. Having a solid base for assessing collateral value of proprietary IP is necessary.

Contracting for Offshoring

The structure of offshoring contracts and the location to which IP is bound affects the value of the IP. For instance, income from royalty rates should reflect the value of use of the IP in the geographic region covered by an IFC or CFC. Use of IP can also be split according to marketing domains. Allocation of partitioned IP is generally determined when it is used to generate income[44].

Since IP is also generated by brand and product marketing, allocations become complex when income attributed to IP is contributed by multiple sources. Sponsors and their CFCs will likely invest in different marketing methods. These contributions can have different life spans than technological components. For software products no amount of marketing can overcome poor quality, so the lifetime of the software component will dominate.

Risk of IP loss

Recently, nearly 60% of companies stated that their primary criterion when opting to forego outsourcing arrangements was related to IP issues; half of those companies stated that greater assurance of IP security would fundamentally alter their decision[45]. Already

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[42] Laurie, R. (2004): "IP Valuation: Magic or Myth?" *Intellectual Property Issues in M&A Transactions*. April.

[43] Thornton, E.A. (2002): "Valuation of Software Intangible Assets"; *ASA International Conference*. San Diego, CA. August.

[44] Smith, G., & Parr, R. (2000). *Valuation of Intellectual Property and Intangible Assets* (3rd ed.). Wiley.

[45] Studt, T. (2007). "R&D Outsourcing Becomes More Strategic" R&D magazine, June 2007, pp.26-29, www.rdmag.com

in 1998, global IP infringement cost reached an estimated $1 billion per day[46]. The need to protect software from loss has been debated for a long time[47].

Risks for IP protected as trade secrets include delivery of copies of source code and plans for further development to competitors. Software used for help desks contains advice and reveal weaknesses that competitors may exploit. Decision support programs often have valuable historical and economic tables embedded those programs, and those data are especially vulnerable.

Data to be protected for privacy reasons is also at risk, but here the liability is not based on its value. IP covered by patents and copyright is at risk in countries where protection is weak, but that issue is not specific to offshoring, since it is already public.

The types and extent of risks vary greatly, and cannot be enumerated or rated here. It is unclear if alternate IP hosting schemes make a difference, since the FBI estimates that 80% of all electronic design theft is attributable to sources inside the company that created the IP[46,48]. In practice, the cost of protection and the cost associated with IP loss must be balanced[49]. But without a valuation of the software and related IP it is hard to assess appropriate measures and determine the level of investment needed to protect against loss.

Taxation

While the benefits of valuing software are becoming apparent to companies, governments have an interest in properly valuing exports and imports. U.S. Treasury regulations stipulate that divisions of an enterprise operating as distinct entities must deal with each other 'at arm's length'; i.e., that assets being bought and sold between controlled divisions must be priced at prevailing market rates. Similar regulations exist in most jurisdictions, leading to proper taxes being levied where the products were produced and where they are marked up for sale.

Income from the export of intellectual property (IP) to foreign entities operating nominally at arms-length should be treated similarly to income from any export, but taxation on the export of IP remains problematical. If the host receiving the IP is a captive CFC or CFH, then the transfer of IP may not be transparent on the sponsor's books, since the books may show only aggregate value[50]. The extraction of profits from

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[46] Mackintosh, I. et al. (2000). "Intellectual Property Protection: Schemes, Alternatives and Discussion"; *VSI Alliance Intellectual Property Protection Development Working Group;* San Jose, Aug. 2000.
[47] Branscomb, L. (chair) et al. (1991). *Intellectual Property Issues in Software; Computer Science and Telecommunications Board*, National Research Council, National Academy Press, from: http://books.nap.edu/books/0309043441/html/
[48] Mackintosh, I. et al. (2000). "Intellectual Property Protection: Schemes, Alternatives and Discussion"; *VSI Alliance Intellectual Property Protection Development Working Group;* San Jose, Aug. 2000.
[49] Gates, Bill: "Losses due to copying must be balanced with disincentives and costs of protection methods"; quote during a discussion on "Building Confidence in a Connected Marketplace", 1 Oct 2004, Computer History Museum, Mountain View, CA.
[50] GOA (1995, April). International Taxation: Transfer Pricing and Information on Nonpayment of Tax. U.S. Government, GOA/GDD report 99-39.

sponsors and sellers via royalties using complex IP hosting structures is common[51]. The amounts involved in these arrangements are massive[52]. Developing countries are commonly deprived of tax income to grow their respective infrastructures[53].

The onus for a reliable valuation is on the taxpayer who transfers the IP, just as it is for tangible properties. The concept of an 'arm's length standard' is to allay any suspicion that minimization of taxes plays a role in the valuations. For taxpayers and for the governments the lack of standardized and reliable IP valuation techniques has hindered assessment of taxation effects when considering offshoring costs.

Some countries are stepping up to combat this problem[54]. The EU is also seeing more stringent transfer pricing documentation requirements. Additionally, many countries (such as Brazil) are beginning to impose special taxes on service or IP importation, and these must be taken into account when making strategic decisions related to offshoring of IT tasks[55]. Finally, new U.S. Treasury transfer pricing regulations (see: IRC §§ 1.482-1T(d), 1.482-4T(f), 1.482-8T) seek to allow the usage of profit-based transfer pricing methodologies that allocate income in a manner corresponding with the economic value added; more so, at least, than the previously stipulated market and cost-based methods. Pricing audits, based on the approval of new U.S. Treasury transfer pricing regulations for services and IP, oblige business decision makers to properly value IP[56].

Legal motivations

While this paper does not address legal approaches to valuation, it is obvious that quantification of IP value protected by copyright, patenting, and trade secrets is essential when pursuing infringements or contract breach damages. Offshoring adds a new dimension, as it can lead to an increase in the risk of loss and can make recovery more difficult.

Contract structuring in offshoring arrangements involving software IP requires an understanding of software maintenance which is not covered in legal references. Often physical property rights are ~~inapplicably~~ inappropriately applied to software, leading to inefficient contracts being drafted[57]. Ongoing responsibilities to keep the software fit for commercial use are more onerous than seen in physical property.

Penalties for failure to comply with regulation provides a further incentive to properly value IP. Such failures are due both to unawareness of IP issues and the difficulties of

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[51] Martinson, O.B., Englebrecht, T.D., and Mitchell, C. (1999). "How multinational firms can profit from sophisticated transfer pricing strategies"; *Journal of Corporate Accounting & Finance*, Vol. 10, No. 2, pp. 91-103.

[52] Economist (2000, January 27). Gimme Shelter. Survey, *The Economist*.

[53] OECD (1998). Organization for Economic Cooperation and Development (OECD): Harmful Tax Competition, An Emerging Global issue; OECD.

[54] Ihlwan, M. (2006, December 4). Public Scorn for Private Equity. *Business Week*.

[55] Bierce, W. (2006). "Biggest Outsourcing Legal Issues of 2006." *HRO Europe*. Jan., 2006. Retrieved from http://www.outsourcing-law.com/articles/1023_biggest_legal_issues_2006.htm.

[56] Carson, Ron (2008): "Intellectual Property Audit and Management"; Chapter 33B in Gordon Smith and Russell Parr: *Valuation of Intellectual Property and Intangible Assets*, 3rd edition; 2008 Cumulative Supplement, Wiley 2008.

[57] Walden, E. A. (2005). "Intellectual Property Rights and Cannibalization in Information Technology Outsourcing Contracts" *MIS Quarterly*, Volume 29 Number 4, December 2005, 699-720.

applying common valuation methods to software IP. Unpaid 'back' taxes sought by the IRS can be compounded by penalties amounting to 40% of the underpayment. These issues will become more common in the near future; 80% of all multinational companies expect to face a tax authority 'pricing audit' soon; for example, Merck is under scrutiny for $1.87 billion with the Canada Revenue Agency[58]. Having justifiable valuations can minimize legal problems.

Why are SW IP Values Currently Underestimated?

Even though billions of dollars are spent on it every year, few managers truly understand the value that hardware and software contribute to their businesses. A study, performed in 2007, by Micro Focus and INSEAD highlights the current state of affairs: of the 250 chief information officers (CIOs) and chief finance officers (CFOs) surveyed from companies in the US, UK, France, Germany and Italy, less than 50% had even attempted to value their IT assets, and over 60% did not assess the value of their software[59]. Software has been termed as the "last remaining hidden corporate asset."

Due to the slithery characteristics of software, little guidance exists for software valuation. When the topic is addressed, lawyers, vendors, and promoters try to quantify software benefits; the results are inconsistent and rarely helpful[60]. Currently, the most thorough valuation occurs during mergers and acquisitions (M&A) when entire software companies must be valued. In those cases market capitalization provides a base for the aggregated value of all of the IP being acquired. Any unexplained market value though is assigned to goodwill. This article has ignored booked values for software acquired in mergers.

Some Software is Not Property.

In many academic settings there is a bias against applying the term 'property' to any manifestation of knowledge created by academic research, including software. A contributing factor to neglecting software valuation is the increasing visibility of Open Source Software. Many computer scientists have argued that software should be a free, 'emancipated' asset, citing that some of the world's most successful and widely used software is free (GNU/Linux)[61]. Such software is indeed widely used and improved by thousands of enthusiasts, and cannot be considered anyone's property. There is also software that is licensed without cost, since the owners expect to garner income from servicing the software or selling related products. We do not know how to value such software.

Due to the profit generating ability that knowledge embedded in software possesses, it is highly unlikely that all software will be free in the future. In 2002 alone, the commercial software industry (SIC 7372) had total sales in just the US alone exceeded $32 billion. Even universities license software developed in their academic departments to businesses. Much more software is internally developed and maintained. Today, total

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[58] Drucker, J. (2007). "Lifting the Veil on Tax Risk: New Accounting Rule Lays Bare A Firm's Liability if Transaction is Later Disallowed by the IRS" *The Wall Street Journal*. 25, May, 2007. Retrieved June 22, 2007 from http://webreprints.djreprints.com/sampleWSJwr.html

[59] Kwan Yuk, P. and Stafford, P. (2007). "Study Urges IT Valuation Rethink," *The Financial Times*, Nov. 4, 2007. Obtained from FT.com.

[60] Lev, B., (2001). *Intangibles, Management, Measurement and Reporting*; Brookings Institution Press.

[61] Gay, J. (Ed.) (2002). *Free Software, Free Society: Selected essays of Richard M. Stallman*: GNU Press.

annual commercial software costs are estimated to be about $250 billion in the US alone. <citation?>

IP associated with Software

IP embedded in the software code rarely stands alone. With an offshore transfer, related IP is transferred as well. Important are the documents and plans that explain the software, as well as documents and trademarks that help market the software. Trademarks associated with the software are often broad and not specific to a service or product being valued. Allocating income across product lines for distinct components of IP is complex, and involves significant subjectivity[62].   Dealing with such an allocation is beyond the scope of this article.

If the sales rights to foreign territories are included in an offshoring transfer customer loyalty can add significant value, which can be estimated from regional sales data.

Conclusion

Since intangibles drive the profitability of modern enterprises, consistent Intellectual Property (IP) valuation is a critical issue for businesses. Internet and communications technology allows financial and intellectual property to be transferred rapidly and invisibly. This flexibility facilitates commerce, but also means that businesses face greater challenges in controlling the flow of their Intellectual Property (IP) assets. The strategic exploitation of IP is vital to sustainable profitability, and is important in order to comply with regulations that continue to grow in complexity. Unfortunately, software, both a major contributor to profits and a significant cost item for many modern companies, is not recognized on financial balance sheets, significantly hindering the internal management as well as the equitable analysis of these businesses by investors.

This need for IP to be properly quantified is exacerbated in offshoring arrangements. As offshoring becomes more widespread, benefits and costs must be understood and balanced. While transfer of jobs has a high emotional interest and visibility, the long-term effects of intellectual capital transfer may be of greater importance. The alternatives of contractual and hosting arrangements available for cross-border outsourcing arrangements can only be assessed if their value is known. The need for proper valuation of software and related IP exists in any situation where IP is moved beyond control of the sponsors' home countries and exposed IP to increased risk-.

The transfer of both monetary and intellectual capital must be considered when establishing a proprietary Controlled Foreign Corporation (CFC) because failing to value IP in this scenario can lead to improper estimation of costs and risks. This may later prove to be more costly than if a company had expended the initial effort and money to ascertain the value of the IP to be transferred. Valuation is also essential to assess:

1. The alternatives of imposing royalties versus initiating an IP transfer
2. The extent of the risks inherent in offshoring arrangements
3. Tax effects when entering into offshoring arrangements

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[62] Damodaran, A. (2006). Dealing with Intangibles: Valuing Brand Names, Flexibility and Patents Working Paper. *Stern School of Business Reports.* Jan., 2006.

Assigning values to software and related IP is already done internally whenever IP is hosted in a Controlled Foreign Holding (CFH) used as a tax haven, otherwise the corporate benefits could not be obtained. How the numbers are obtained ~~may~~ are mostly not ~~be~~ made public.

IP valuation requires projection into the future, and hence can never be certain. But that is what planners in business settings have to deal with. So valuation should be done as well as it can be done. By indicating the role and capabilities of 4 distinct valuation methods in this paper the uncertainty can be circumscribed and discussed. Dealing with software does bring complications that tangibles and most intangibles do not present. But these complications, mainly due to the ongoing maintenance, can be dealt with as well. The fact that software is slithery because of maintenance is recognized by software engineering experts, although ignored by educators[63]. Within a company both the incremental investment inputs and the code outputs of maintenance can be made visible. The quality of the data will depend on the maturity of the software. Projection into the future is still required. Today those metrics are not recorded and made available to the economists who are in charge of software valuation. <<< Once management recognizes the importance of valuing software the required data can be collected and processed. >>>

This article attempts to stress to business decision makers the importance of IP valuation in offshoring arrangements. The difficulties in assessing IP value are such that attempts to do so may seem incidental to the project at hand, and are easily lost in a focus on myriad other factors. But, it is within these offshoring arrangements where IP valuation is most important. The valuation of software is not easy, and requires many assumptions. But it can be done. Economists and technologists must cooperate and clarify to executives the data requirements and the remaining uncertainties of their results. The cost-benefit and risk analyses required for offshoring software use and software development depend on such valuations. Without this, decisions about alternatives will be based on naive assumptions and may lead to erroneous decisions.

In closing, we reiterate: valuing a company's intellectual assets properly is essential for effective management. The specifics addressed here: offshoring of IP inherent in software, is just one aspect that may bring urgency and focus to the issue.
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~~From introIf royalties for the use of IP are paid to the locales where the IP resides from the locales where the IP is used to create products, then issues become more complex. Preventing loss of IP must focus on the country where it IP is being used, but the eventual loss of profits is felt in the country where the IP formally resides. We expand on the hosting issue later.~~

<Gio: I am not sure that the formatting scheme of headers, sub-headers, and so on, have been consistently applied. Sorry I have run out of time to verify.>

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[63] Wiederhold, G. (2006). "What is Your Software Worth?" *Communications of the ACM*, 49 (9), 65-75.