

Chapters 15: Valuation of Intellectual Assets

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**“Modern technology ... down
47 floors in six seconds.”**

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Summary

Knowledge assets provide the “competitive edge” that allows a company to generate superior profits, seize market share and build customer loyalty. Knowledge assets are often a company’s most valuable assets, yet traditional accounting methods frequently fail to capture their full economic worth. It is only when the true value of an asset is known, that informed decisions are possible as to its best use. In this chapter, we will present an overview of various business valuation issues and methodology applicable to knowledge assets.

Valuing new technologies can be particularly difficult. Companies will adapt valuation techniques to suit their situations and it is a good idea to use experts in the field. Chartered Business Valuators (CBV) are experts in valuation technique with an understanding of the importance of the many different components of value. These chapters introduce some basic financial tools for evaluating technologies and making related decisions. These methods provide quantitative results that help the decision-making process. Not using these tools can mean that the process relies only on “gut” reaction instead of a methodical approach to expressing value. This chapter will provide an overview of the importance of key people who can help manage value in any firm.

Topics addressed in these chapters include:

- what are knowledge assets?
- why value knowledge assets?
- how is value defined or expressed?
- components of corporate value?
- valuation approaches
- rules of thumb
- value of people

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What are Knowledge Assets?

There is no conclusive definition of the term “knowledge asset”. We regard knowledge assets as being identifiable intangible assets that evolve from an intellectual or creative process or advance; that grant rights and privileges to the owner; and that enhance the earning power of an enterprise through commercial exploitation.

Knowledge assets include:

- intellectual capital such as patents, copyrights, trademarks and trade secrets (formal & informal);
- proprietary technology, including software;
- brands dependant on underlying intellectual capital; and
- related contracts such as licenses, franchises and other rights grants.

There are several strategies used to capture value. This text has already discussed many different kinds of IP protection. Legal protection for companies that want to invest further in commercialization is necessary in many industries. Issues to address include:

- the form of protection;
- the strategic use of broad or narrow patents; and
- the advantages and disadvantages of each kind of protection.

Capturing and appreciating value depends on an organization’s values. Once these values are identified, the firm can value a product or technology. In addition, by identifying its vision, the company can decide if a product or technology fits within its strategic plan and goals. All these factors determine the strategy to capture value—whether through patents, licensing, spin-off companies, or joint ventures.

Knowledge asset communication is necessary for different reasons.

- Mergers, Acquisitions and Divestitures
- Alliance, Joint Ventures and Licensing
- Financial Statement Presentation
- Debt Financing
- Income Tax and Transfer Pricing Issues
- Infringement and Other Litigation
- Strategic Decision Making and Planning

Why Value Knowledge Assets?

The valuation of knowledge assets benefits owners, managers, investors and others in a wide variety of circumstances, including:

- a) Mergers, Acquisitions and Divestitures

Valuations are used to determine selling prices, appraise acquisition opportunities and negotiate merger terms. Knowledge assets may be transferred in isolation or as part of an entire business. Companies are often acquired in order to secure access to a brand, technology or other intangible.

The investment community uses valuation analysis to determine prices for primary and secondary public offerings, and in day-to-day trading. Companies that fail to recognize and exploit the value of their underlying knowledge assets will not be optimizing shareholder value and may become takeover targets.

b) Alliance, Joint Ventures and Licensing

Increasingly, companies are gaining access to knowledge assets through alliance, joint ventures and licensing agreements, rather than by direct acquisition. These arrangements serve to allocate the benefits of the underlying knowledge asset between joint venturers, or between licensor and licensee, as the case may be. If the value of the specific knowledge asset is known, then terms can be negotiated which result in a fair return to both parties.

c) Financial Statement Presentation

With limited exceptions, generally accepted accounting principles in Canada and United States do not permit the inclusion of intangible assets on balance sheets unless purchased from third parties. Other jurisdictions, such as the United Kingdom, are more liberal. Where knowledge assets are included, valuation analysis is helpful in assessing whether the book value is reasonable or should be written down.

The omission of knowledge assets from financial statements often leads to an understatement of true shareholders' equity. The market capitalizations of many "internet" companies such as Yahoo Inc. are almost entirely attributable to unrecorded knowledge assets. Where knowledge assets are included in financial statements, the marketplace may assign values to them that are substantially greater than their book values (for example, The Walt Disney Co.).

d) Debt Financing

It has traditionally been difficult and/or costly to secure debt financing for intangible assets. An independent valuator can prepare valuations and/or cash flow projections to provide comfort to lenders.

e) Income Tax and Transfer Pricing Issues

Income tax issues arise when there is an asset transfer or royalty flow from a high-tax jurisdiction to a low-tax jurisdiction. A valuation may be required to establish that the transaction is at fair market value.

f) Infringement and Other Litigation

Valuation analysis is used to establish actual or potential loss in an infringement suit, or to value an asset subject to competing claims in corporate or matrimonial litigation.

g) Strategic Decision Making and Planning

Valuation analysis is of strategic assistance to management in:

- deciding whether it is more cost effective to develop or to purchase a knowledge asset;

- deciding whether a knowledge asset should be exploited directly by the company, or indirectly, through licensing or other means; and
- assessing whether the company’s resources are being optimally managed, based on the rates of return generated by knowledge asset(s).

Tools for Extracting Value

<i>New Business Development Mechanism</i>	<i>Major Advantages</i>	<i>Major Disadvantages</i>
Internal development.	Uses existing resources.	Time lag to break even tends to be long. Unfamiliarity with new markets may lead to business errors.
Acquisition.	Rapid market entry.	New business area may be unfamiliar to parent.
Licensing.	Rapid access to proven technology. Reduces financial exposure.	Not a substitute for internal technical competence. Not proprietary technology. Depends on licensor.

Value is expressed in different ways for different reasons. As discussed in previous chapters there is a great need for these skills when trying to extract value from intellectual capital produced by a knowledge organization. For purposes of internal development within a gated decision process for research and development projects, for purposes of mergers and acquisitions, and for purposes of licensing the valuation skill set is fundamental to any firm’s ability to maximize the final value it achieves for its owners.

How Is Value Defined & Expressed?

There are several generally accepted approaches to valuation. There is no single formula that applies to all valuation issues. In addition to using the tools below, you need informed judgment (i.e., your experience) experience, and common sense to determine a reasonable valuation. There are limitations in using these techniques to value new and untested technologies. Some companies use more than one financial tool to provide balance to their predictions.

The value term most often used by business valuers is “fair market value”. This is defined as follows:

“Fair market value may be defined as the highest price, in terms of money or money’s worth, obtainable in an open and unrestricted market between informed and prudent parties, acting at arm’s length, neither party being under any compulsion to transact.”

In the absence of purchaser synergies, fair market value is equal to intrinsic value. This is a notional value that valuers believe would prevail based on rates of return required by investors, given the economic and business conditions existing at the valuation date. Certain purchasers may be able to pay more than intrinsic value due to synergies such as economies of scale or the elimination of a competitor. If a number of these “special purchasers” exist in the marketplace, they may bid against each other and set a fair market value in excess of intrinsic value.

The value definition used will depend on the purpose of the valuation. If an arm's-length transaction is contemplated, then "fair market value" will generally be appropriate. If not, then "value in existing use" may be used. This value is similar to fair market value, but considers *existing*, rather than highest and best use. Orderly liquidation value may be used to determine security value for financing purposes, while a forced liquidation value may apply in a bankruptcy.

Regardless of the value definition, a number of basic considerations apply:

- Value is prospective, that is, it is equivalent to the present value of all *future* economic benefits anticipated to flow from the asset. Historical performance may be an indication of future performance, but often is not.
- Price may differ from value. The definition of fair market value assumes a number of "ideal" conditions that may not prevail in the marketplace.
- Value is determined at a specific point in time, taking into account factors known or reasonably contemplated at that point. A valuation becomes outdated as these factors change.

Components of Corporate Value

The process of transferring knowledge for commercial gain involves putting values on a broad range of intangible assets. The obvious assets include the forms of intellectual capital that we have already considered, i.e., patents, trademarks, copyrights and software.

There are several less obvious intangibles that can also have value. These include:

- slogans or characters, e.g., "just do it," Mickey Mouse, etc.;
- packaging designs and graphics;
- non-competition clauses;
- proprietary technology;
- engineering designs and drawings;
- distribution channels;
- taxes and R & D credits.

Intellectual capital management has increased in importance (illustrated by the Dow Chemicals example, discussed in chapter 3, Assets and Intellectual Capital), as intellectual capital management can contribute to product and company value. The advantages of attaching value to intangible assets include:

- achieving fair licensing agreements and appropriate royalty rates;
- identifying risk factors that may affect licensing decisions;
- indicating where royalty payments are expected—a test for licensees who do not report all of their royalty payments;
- attaching an appropriate value when selling the intellectual asset;
- establishing the appropriate value in spin-off situations where one party is contributing IP and another is contributing tangible assets and capital;
- obtaining financing—some financial institutions will accept IP as loan collateral.

Intellectual Asset Management and Technology Commercialization

From an accounting perspective the various components of corporate value are set out below:

- Working capital (current assets – current liabilities)
- + Capital assets
- + Other tangible assets
- + Identifiable intangible assets (including knowledge assets)
- + Commercial goodwill
- = Enterprise value (also known as total asset value or total invested capital)

- Long-term debt
- = Equity (share) value

Note: For purposes of the above equation, all assets and liabilities are restated to fair market value.

For publicly traded companies, enterprise value can be estimated by subtracting long-term debt from market capitalization (share trading price multiplied by the number of shares issued and outstanding).

If enterprise value or share value is known, then the value of intangible assets may be calculated as a residual, as follows:

- a) fair market value of intangible assets = enterprise value – working capital – capital assets – other tangible assets, all restated to fair market value; or
- b) fair market value of intangible assets = share value – value of net tangible assets (net tangible assets = working capital + capital assets + other tangible assets – long-term debt, all restated to fair market value).

Traditionally, a business' entire intangible assets were referred to as "goodwill". In this usage, goodwill represents the present value of a business' "excess earnings", being earnings in excess of a reasonable return on the business' net tangible assets. A reasonable return on monetary assets may be determined by reference to rates of return on monetary instruments of equal duration, while a reasonable return on capital assets might be the lending rate on loans secured by the capital assets, adjusted for the increased risk of ownership.

As the marketplace has become more sophisticated, it is now preferable to allocate intangible value among a business' identifiable intangible assets to the extent possible, with the residual, if any, being attributed to general commercial goodwill. In addition to the knowledge assets defined above, identifiable intangible assets may include such assets as a well-trained work force, customer lists and favourable supplier contracts. In practice, it is often difficult and at times impossible to separate intangible value into its various components.

Valuation Issues in Emerging Markets

- o Lack of operating history
- o Lack of proven product
- o Instability in capital structure
- o Intellectual property of founders

- No positive earnings or cash flow to capitalize
- Competitive advantage
- Potential for rapid growth
- Special purchaser markets
- Difficult market assessments
- Commercialization management team
- Alliance structures & Exit strategies
- Right number of research projects for available resources
- Communications to public markets

Issues Affecting Valuation of Knowledge Assets

The valuation of knowledge assets presents a number of unique challenges. There are often questions regarding the identification, ownership, separability or transferability of these assets. A knowledge asset may be an inseparable bundle of rights, systems and other intangibles. For instance, a brand may be based on a patented product with a trademark name, promoted by a distinct advertising theme. Certain knowledge assets, such as patents and copyrights, are legally defined and protected; others are not. The ownership of a knowledge asset may be shared. It is necessary at the outset of the valuation to identify the particular ownership interest being valued, together with the associated rights and restrictions.

The term “market value” contemplates a transaction between a willing buyer and a willing seller. Therefore, only knowledge assets that are transferable have a market value. Knowledge assets rarely function in isolation. Rather, their value to a business flows from their contribution as part of a going concern that also includes monetary assets, tangible assets, other identifiable intangible assets and general commercial goodwill. In some cases, the knowledge asset may be so dependent on the business’ other assets that it cannot be transferred or valued separately.

Valuation Approaches

General

Notwithstanding these difficulties, knowledge assets may be suitably valued using a number of generally accepted valuation approaches.

The pace of technological change may affect the choice of methodology. In the knowledge economy it often becomes easier and easier to reverse engineer or otherwise design around even proprietary technology with the passage of time. The cost, market and income approaches to valuation must always be viewed from the perspective of the time at which the valuation is done. Where inexpensive solutions exist for solving what were once difficult technical challenges, no technology can be worth more than the value of its available comparable substitutes.

The most important factor affecting brand value is the "perceived quality of the product or service in the eyes of the consumer". Various approaches to the valuation of brands were explored in earlier chapters during the discussion of trademarks. The details will not be repeated here.

The three primary valuation approaches, are:

- Cost;

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- Market; and
- Income (discounted cash flow, capitalized earnings or capitalized cash flow).

Cost

This is a relatively unsophisticated approach with limited uses. Cost may be defined as:

- Historical cost (book value); or
- Replacement cost (cost of replacing or reproducing the asset, in current dollars).

Cost is usually determined by net of depreciation, based on the diminution of the asset's economic utility and life.

The cost approach may be useful in:

- determining liquidation value;
- in valuing proprietary software, production processes or other internal systems that cannot be transferred independently of the business; or
- in valuing very early-stage knowledge assets. For instance, early-stage product software (software produced for sale, rather than for proprietary use) is sometimes valued using a cost approach. This approach assumes that a prudent purchaser would pay no more than the cost of reproducing the software. Cost may include project coordination, programming, documentation and testing.

The cost approach has serious deficiencies. In a going-concern situation, value is a function of the future benefits (earnings or cash flow) produced by a business asset. The expenditure to develop a knowledge asset is no indication of its ability to generate earnings or cash flow. A patented drug may have a value far in excess of the cost of development. Conversely, a pharmaceutical company may spend as much or more in developing an unsuccessful drug.

The inherent assumption underlying the cost approach is that the asset will, at a minimum, generate a return sufficient to recoup its development costs. If there is no confidence of this, the asset may have little or no value.

Market

In an *active, efficient* marketplace, the price an investor pays for a business asset or share reflects the present value of the anticipated earnings or cash flow stream. In such a marketplace, *recent* transactions involving assets or shares comparable those being valued, can be of immense assistance in establishing fair market value.

Unfortunately, knowledge assets rarely trade in an active, public marketplace. Such information as is available, may not include all of the factors influencing price. Because of the unique nature of most knowledge assets, it is difficult to identify truly comparable assets or companies. Similar knowledge assets may have different values depending on the industry in which they are employed, the specific uses to which they are put, and the other corporate resources in place.

Nonetheless, there are many situations in which a market-based approach is useful as either a primary or secondary (next to income) valuation method. For instance:

- Information on royalty rates is available from a number of public and private sources.
- Information as to the sale of specific knowledge assets, such as brands or publishing rights, is sometimes publicly available.
- It may be possible to identify transactions involving companies whose value depends primarily on knowledge assets of the type in question. The value of these knowledge assets can sometimes be estimated by deducting net tangible asset value from share value, as discussed above. Public share trading information may be used in a similar fashion.
- The value of a knowledge asset such as a brand or patent can sometimes be estimated by comparing the value of a public company selling a comparable branded or patented product, with that of a similar public company selling a generic product.
- Comparable company trading and transactional data can also be used to calculate price-earnings or price-EBITDA (earnings before interest, taxes, depreciation and amortization) multiples that are helpful in an income-based valuation, to derive capitalization and discount rates.

When reviewing public company trading information, it is important to note that market trading prices reflect *minority, liquid* interests. It is generally necessary to make adjustments for these and other factors (company size, nature of operations, profitability, capital structure, and so forth) before using public company-derived trading multiples in the valuation of privately-held knowledge assets.

Discounted Cash Flow

In the absence of true market comparatives, knowledge assets are generally valued using a discounted cash flow (“DCF”) approach. The DCF approach is theoretically the most sound of the income-based approaches. It is the only income-based approach that may be used to value assets of a finite economic life, a category that includes most knowledge assets.

In a DCF calculation, the amounts of future cash flows are set out on a timeline, then discounted to a present value using a discount rate that reflects the financial and business risks involved. The higher the discount rate used, the lower the value of the asset. If, *and only if*, the knowledge asset has an unlimited life, the final year of the projection may include a residual value equal to the value of the asset *at that time*. The residual value is typically determined using a capitalized earnings or a capitalized cash flow approach.

The cash flows used in a DCF valuation are generally on a pre-debt (before interest), after-tax basis. The decision of how to finance (capitalize) a knowledge-based asset or business, whether through debt, equity or a combination of both, is independent its value. A pre-debt valuation analysis produces a value untainted by a sub-optimal capitalization.

A sample DCF calculation, which determines the value of a knowledge asset based on a royalty stream, is set out below.

Sample Royalty Calculation

Year	2000	2001	2002	Residual 2003 and thereafter
Qualifying revenue	100,000	110,000	121,000	
Royalty at 5%	5,000	5,500	6,050	
Income tax at 45.62%	(2,281)	(2,509)	(2,760)	
Royalty income after tax	2,719	2,991	3,290	
Residual value (Note 1)				21,933
Discount factor @ 15%	0.8696	0.7561	0.6575	0.6575
Present value	2,364	2,262	2,163	14,422
Sum of present values	21,211			

Note 1: $3,290 / 15\% = 21,933$

For illustrative purposes only, we have made the somewhat unrealistic assumption that the royalty stream will continue indefinitely, and will not require any expenditure to maintain. The residual value is determined using a capitalized earnings approach in which maintainable after-tax income is divided by a capitalization rate. We have used the same 15% rate as both a discount rate and a capitalization rate. In practice, these rates may well differ. The present values of annual cash flows and of the residual value, if any, are then summed to produce an asset value. If the asset value is comprised primarily of residual value, as it is in the sample, this may be an indication that the valuation is aggressive.

The DCF approach may be used to value the knowledge asset itself, or to determine the value of the entire business. If a knowledge-based business is valued using a pre-debt, after-tax cash flows, then the sum of the discounted cash flows will equal enterprise value. To arrive at equity value, it is necessary to subtract long-term debt. The value of the knowledge asset may then be ascertained by subtracting the values of the business' net tangible assets and other intangible assets. See the "Components of Corporate Value" discussion.

Cash Flows

In performing a DCF analysis, it is necessary to identify the cash inflows and outflows associated with the knowledge asset. Typically, knowledge assets add value to a company by enabling it to consistently generate premium profits. These above-average profits may arise as a result of either:

- Premium pricing. Typically, a company with a well-known and trusted branded product will be able to charge a higher price than a company selling a similar generic product. A patented drug may be able to capture an exclusive market for the life of the patent.
- Cost reduction through patented production technology, proprietary know-how, management software and other intangibles.

In practice, the absence of a comparable generic product may make it difficult to quantify premium profits. Cash flows may also be estimated using the "royalty foregone" approach, or its mirror image, the "relief

from royalty” approach. In the royalty foregone approach, the value of a knowledge asset to its owner is based on the notional royalty income that the owner would *receive* by licensing out the asset. The relief from royalty approach estimates the royalties that are *saved* as a result of owning the knowledge asset rather than having to license it. Royalty rates may be expressed as a percentage of revenue or as a dollar amount per unit sold.

There are several potential pitfalls associated with using the royalty methods. Firstly, a degree of judgement is involved in determining a reasonable royalty rate. “Rules of thumb” may be inappropriate and misleading. Market research may yield a broad range of rates but no true comparatives. Not only do knowledge assets differ widely in terms of asset strength, outlook and economic life; but licensing agreements also differ as to term of the license, exclusivity, territory covered, sublicensing rights and financial obligations of the licensee. A long-term exclusive license over a broad territory in respect of a proven, highly profitable product will generally be able to command a higher royalty rate than a more limited license in respect of a weaker product.

We suggest that an investment-based analysis be used to augment market research. A reasonable royalty rate is one that provides a reasonable rate of return to both the licensee and the licensor. The royalty rate should not be set so high as to claw back all of the licensee’s premium profits from the knowledge asset. If this is the case, there is little incentive for the licensee to grow the business. Conversely, the owner of the knowledge asset will not wish to give up the asset for a rate of return significantly less than could be achieved by exploiting the asset in-house.

In short, a reasonable royalty rate involves a sharing between the licensor and licensee of the risks and benefits associated with the knowledge asset. This brings us to a second potential pitfall. By looking only at royalties saved or foregone from the point of view of the *owner (notional licensor)*, and ignoring the benefits to the licensee, the royalty method may result in an under-valuation of the knowledge asset.

Premium profits or royalties cannot continue indefinitely without support. The cash flows used in the valuation analysis should be net of all expenditures required to maintain the knowledge asset. These may include administrative costs, advertising and promotion (to maintain brand recognition, for example), legal costs (to protect and defend intellectual property rights), additions to working capital and capital assets, and research and development costs.

It is critical that the projected cash flows not continue beyond the economic useful life of the knowledge asset. The economic life of an asset is the expected period over which the asset is expected to make a positive net contribution to earnings. In many cases, economic life can be considerably shorter than the asset’s legal or functional life. Software, for instance, may be economically obsolete within a few years.

On the other hand, some knowledge assets lend themselves to “spin-offs” or “extensions” that can result in positive net cash flows after the life span of the original asset has ended. For instance, successful movies can generate videos, sound tracks and merchandise. A 17-year patent may lead to the development of a brand of indeterminate life. In valuing knowledge assets, cash flows from spin-offs and extensions may be considered if there is a reasonable probability of their occurrence. In general, higher discount rates should be applied to these cash flows to reflect the increased risk associated with them.

Discount Rates

It is important to match the discount rates used in DCF analysis to the nature of the cash flows being discounted. Pre-debt, after-tax cash flows represent the available return to both debt holders and equity holders. Accordingly, the appropriate discount rate is the weighted average after-tax cost of capital (“WACC”). If the cash flows are pre-debt and *pre-tax*, a pre-tax WACC is appropriate. Cash flows that are *after* both debt and tax are present-valued using a discount rate equal to the cost of equity.

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A sample WACC calculation is set out below.

	After-tax Cost	Weight	Weighted Average
Debt	6%	1/3	2%
Equity	30%	2/3	<u>20%</u>
			<u>22%</u>

The WACC calculation is based on an optimal ratio of debt to equity, assumed to be 1 to 2 in the sample. The after-tax cost of debt is based on the business' current cost of borrowing the indicated level of debt. The cost of equity is the rate of return required by equity investors, given the financial and business risks involved. The cost of equity may be calculated in a number of ways:

- Market trading price-earnings ratios or transactional information may be used if sufficient comparability can be established. Adjustments may be required for differences between the comparable company and the business being valued.
- A build-up model is frequently used. In a build-up calculation, the cost of equity is generally calculated as the sum of a risk-free rate of return plus a risk premium. The risk-free rate is generally understood to equal the current return on long-term Government of Canada bonds. This rate should be adjusted to exclude inflation if the projected earnings or cash flows are in constant (before inflation) dollars. Factors impacting the risk premium include the stage of development, the track record of the company, market size and share, competitive factors, management strength and so forth. Economic and industry conditions and outlook are also considered.
- Capital asset pricing model ("CAPM"). The CAPM equation is:

$$\text{Required rate of return on equity} = \text{risk-free rate of return} + (\text{market risk premium} * \text{Beta}).$$

The market risk premium is the expected rate of return on a market portfolio less the risk-free rate of return. Beta is a measure of the relative risk (volatility) of the security being valued compared to the risk of the market as a whole. Market risk is caused by movement in underlying economic and market conditions that affect all investments, and thus represents undiversifiable risk. According to CAPM theory, if an investor holds a diversified market portfolio, then company-specific risk is diversified away and no longer relevant.

However, owners of knowledge assets generally do not hold a diversified market portfolio. Also, CAPM analysis is based on data from public companies, and is not directly applicable to privately-owned assets. Therefore, in valuing knowledge assets, the basic CAPM equation may require adjustments to "unlever" Beta (that is, remove the effect of debt from the Betas of comparable companies), and to add additional risk premiums to reflect the illiquidity and specific risks associated with the knowledge asset.

The cost of equity must be reasonable in the context of the rates of return and risks associated with other investments available to investors at the valuation date. New technologies may call for equity rates of return in a venture capital range of 35% to 50%.

There are many possible refinements to a DCF analysis. For instance:

- different probabilities may be attached to the cash flows of different years prior to discounting;

- different discount rates may be used for different years of the projection;
- a weighted average calculation may be performed in which “best case”, “average” and “worst case” scenarios are weighted with the relative probability of their occurrence;
- statistical probability analysis may be performed using the “Monte Carlo” or other sophisticated methods; or
- option pricing theory and decision tree models may be used.

Product Software

Early-stage product software is frequently valued using a DCF approach. Because of the especially challenging nature of such valuations, a brief commentary is in order. Such software is typically characterized by:

- few or no tangible assets;
- unproven commercial viability;
- dependence on key people;
- short life cycle;
- potential for high growth and profits;
- rapid income tax write-off; and
- significant risk of failure.

When valuing product software (as with all valuations) it is important to be realistic. In spite of management’s optimistic projections, “trees do not grow to the sky”. If the product is successful, revenue growth may at first be rapid, but then will typically diminish as the product matures and competition enters the marketplace. The product life cycle is typically short and there is generally no residual value at the end of the projection period.

Growth cannot be sustained without a considerable investment in research and development, marketing, administration, working capital and capital assets. All of these items must be subtracted in determining net cash flow in a DCF valuation. Recent empirical research¹ involving publicly-traded United States and Canadian software companies, indicates that:

- Gross profit margins (sales – cost of sales) range from 80% to 100% of sales revenue;
- For most companies, research and development (“R&D”) costs average 10% to 30% of revenue;
- Sales and marketing expense typically represents 20% to 40% of revenue; and
- Operating earnings (revenue – cost of sales – R&D – sales, general and administrative expense) is most often in a range of 0% to 10% of revenue.

¹ Simon J. Anderson, “Valuing High Technology Businesses – Fact vs. Fantasy”, *The Journal of Business Valuation* (1999).

Intellectual Asset Management and Technology Commercialization

Canadian income tax regulations permit rapid depreciation of software: 30% per annum for systems software and 100% per annum for other software. Depreciation (capital cost allowance) is calculated on a declining balance basis, with one-half of the usual rate available in the year of acquisition. These provisions create a significant cash flow advantage that should be factored into the DCF calculation.

Because of the high risks associated with emergent software enterprises, discount rates used by valuers are high, typically 25% to 50%, depending on the stage of development and production.

Capitalized Earnings or Cash Flow

The capitalized earnings approach and its close relative, the capitalized cash flow (“CCF”) approach, are income-based valuation approaches that may be used if, *and only if*, the knowledge asset is expected to generate a stable, maintainable level of earnings or cash flow for an indeterminate period of time.

The process to determine a maintainable level of net earnings or cash flow produced by the knowledge asset is similar to that involved in a DCF valuation. Net cash flows differ from net earnings in that the former involves an add-back of depreciation and a deduction for capital expenditure.

Maintainable after-tax earnings or cash flows are turned into an asset value by using a multiplier (price-earnings ratio) that is the inverse of the capitalization rate. For instance, if the capitalization rate is 20%, the multiplier is $1 / 0.20$ or 5 times. If maintainable after-tax earnings are \$10,000 per annum, then the indicated value is 5 times \$10,000, or \$50,000. The capitalization rate is calculated in the same manner as a DCF discount rate, except that the growth rate in earnings or cash flow is deducted; that is, capitalization rate = discount rate – growth rate.

The CCF approach is somewhat more complex than the capitalized earnings approach, in that income tax adjustments are required for capital cost allowance on existing capital assets and on annual capital expenditures. Conceptually, the CCF approach is preferable because investors are generally concerned with cash returns on cash investments. If the CCF calculation is performed on a pre-debt basis, then a WACC-based capitalization rate is appropriate.

As with the DCF approach, the capitalized earnings and CCF approaches may be used to value the knowledge asset itself, or the business owning the knowledge asset. A pre-debt valuation of the business will produce an enterprise value. To arrive at an equity value, it is necessary to subtract long-term debt. From that point, the value of the knowledge asset may be determined by subtracting the value of net tangible and other intangible assets.

Rules of Thumb

“Rules of thumb” are not valuation techniques; rather, they are generalizations of what some believe to be industry “norms”. A rule of thumb sometimes cited in relation to licensing is that a reasonable royalty rate should equal 25% of the licensee’s pre-tax profit from use of the license.

- 25% of licensee’s pre-tax profit from **use** of the license.
- 25% of licensee’s pre-tax profit from **sales** of the license.
- For partial contributions (I.e. process improvements) one applies a discounting factor prior to applying the 25%

Caution should be exercised when considering this or any other rule of thumb. Rules of thumb cannot take into account the many critical factors, such as market strength, profitability, economic life, support costs and business risks that are unique to each knowledge asset. Often rules of thumb were developed under industry and economic conditions that no longer apply, in order to provide guidance in the absence of marketplace data or because valuation techniques were not well-understood. A licensor that follows the “25%” rule of thumb without considering the qualities of the particular knowledge asset, the terms of the agreement, or the financial structure of the licensee, may fail to optimally exploit the asset.

In some instances, however, rules of thumb may be derived from actual, recent market transactions. This may be the case in the sale of franchises, where it is not unusual to see prices expressed as a percentage of revenue. This does not mean that income is unimportant, but rather that the cost structure is predictable enough that a certain level of revenue is expected to produce a certain level of income. Where a rule of thumb is strongly supported by actual transactions, it is really akin to a market-based valuation approach.

General Valuation Considerations

The valuation approaches described in this chapter are not mutually exclusive. Wherever possible, valuers prefer to use one or more secondary valuation methods in order to test the conclusion reached by the primary method.

Valuation analysis typically involves the use of a number of assumptions. It is important that these assumptions be reasonable and supportable. The strength of a value conclusion may be tested by performing sensitivity analysis. If a minor change in an assumption dramatically changes the conclusion, then the risk associated with the asset may be greater than initially thought, suggesting a higher discount rate and a lower value.

The discussion thus far has not considered minority interests in knowledge assets. Unless otherwise protected by contract, the owner of a minority interest (50% or less) typically cannot control the return on his or her investment. Accordingly in valuing a minority interest, a valuator may apply a “minority discount” to pro rata en bloc value.

Value of People

Investors and valuers look for specific characteristics when determining a company's potential and value.

One of these considerations, the significance of a management team, cannot be overemphasized. The adage—“back a grade B idea with a grade A team, not a grade A idea with a grade B team”—is true. Personalities and drive can determine the success of an idea or technology. A management team may be rated in many different ways but the most significant of these factors is a successful track record.

Measuring People Skills

<i>Criteria</i>	<i>Greatest Potential for Success</i>	<i>Least Potential for Success</i>
Entrepreneurial team.	All-star combination; free agents.	Weak or solo entrepreneur.
Industry and technical experience.	Top of the field; excellent track record.	Underdeveloped.
Integrity.	Highest standards.	Questionable.

Intellectual honesty.	Know what they do not know.	Do not want to know what they do not know.
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Management is important but their ability to succeed is related fully to the efforts of the people who form the rest of the organization. Any knowledge organization must take steps to both attract and keep the best and the brightest people in the field. Approaches such as the granting of stock options to key people or to all staff have effectively motivated many to work long hours to support a successful team. The development of competitive spirit in any organization is also important to avoid the development of stale attitudes over time. Some firms go so far as to fire the bottom 10% of employees each year based on some form of peer review that assists to weed out the under performers. Valuation of these types of incentive structures is not generally measured objectively, however they are no less important.

Conclusion

Effective valuation is an important tool in the decision-making process. Using a variety of models may allow an organization to consider any new product or technology investment better. There are many different approaches to valuation with different industry standard approaches for different circumstance. The valuation of any business interest is often a complex process calling for specialized expertise and judgment. The valuation of knowledge assets, for the many reasons set out in this chapter, is especially challenging. Chartered Business Valuers and other experts including human resource specialists can be of immense assistance. In summary, the valuation of knowledge assets is an interesting and rewarding field, and a soundly based valuation is well worth the time and effort involved.

Discussion: Valuation

- *Discuss various scenarios in which the different approaches to valuation would be best used.*
- *Discuss the general importance of the need for capital in new and existing enterprise*
- *Discuss differences in valuation needs between new ventures and existing established enterprise.*
- *Discuss the special views of value for early stage companies in emerging markets where companies may have very large market capitalization yet have little or no revenue.*
- *Discuss all case studies*

FAQ: Valuation

1. When is “cost” relevant in establishing the value of IP?

The cost of developing an idea is generally irrelevant to a transferee. An inventor who wastes time and resources may have inflated costs of development. Cost may also be inflated because the inventor has to eliminate unworkable variables—these costs will not be incurred by the transferee’s competitors. There may be no correlation between the actual cost to develop the idea and the benefit expected, or significant funds may be used to develop an idea for which there is no use or a very limited market. Some costs are, however, more important in establishing the value of IP:

- reproducing or working around the invention, especially with a tight time frame;
- acquiring a competitive/displaced product in the marketplace (this cost may set an upper limit on the value and the extent of the competitive advantage);
- reproducing clinical studies for a pharmaceutical product;
- obtaining government approval;
- user savings resulting in innovative technology;
- policing the license agreement: including the availability and cost of a meaningful audit of a “running royalty,” especially in a foreign country; ease and cost-effectiveness of court access to enforce payment; and availability of an effective court order to restrain a continued breach of contract or infringement.

2. How do I locate comparable rates?

Although comparable royalty rates can be useful in establishing royalty rates in subsequent or related transactions, comparing royalty rates can also result in pricing distortions. When comparing technology transfer agreements, be sure to compare all variables, not just the resulting royalty rate. For example, a royalty could be lower in one case than in another if the licensee contributes more, such as material improvements or complementary technology. A royalty rate could also be lower if the territory or field of use for the technology is narrower compared with other rates. A licensee could expect to pay significantly higher royalties to procure exclusivity than to acquire non-exclusive rights.

As long as all variables are considered, comparable royalty rates can, nonetheless, be a useful tool. Sources of comparable rates include:

- the licensor's own, in-house database of comparable transactions (these transactions let you know about the techniques previously used, and the good and bad results of these techniques);
- industry periodicals and periodicals on licensing economics and evaluations (most notable are the publications produced by the Licensing Executive Society and the Association of University Technology Managers);
- security/corporate disclosure documents;
- published court cases;
- Internet sites (in Canada, the Government of Canada web page, <http://strategis.ic.gc.ca>, is an excellent resource); and
- personal networks, industry associations, and other informal communication alliances.

3. What are “spin-off” benefits and how do they influence the value of IP?

Patent claims and trade secrets are the main tools of capturing and controlling technology. “Spin-off” benefits occur when a technology ownership position covers many uses in different industries. Broad protection to technology may have a more enduring value than narrow protection. A technology that can only be used one way and in one industry will be less valuable than a platform technology with multiple uses. For example, a company that markets liquid displays in digital watches (a well established, perhaps even saturated, market), may decide to learn more about producing liquid displays for laptop computers or perhaps for television monitors (a low-volume, higher margin market).

All firms are engaged in "in licensing" of productivity technology such as software. Building a core technology ownership interests requires a view that a companies technology interests exist for more than just purposes of internal productivity. "In licensing" from others doing research in related fields can lead to a stronger competitive advantage than might be achieve internally alone.

Residual non-core technology rights are often the subject of detailed investigations by companies. Firms like IBM and many universities produce very significant revenues by "out licensing" non core technologies to other interested parties. These firms also save greatly by eliminating redundant technology that is not viewed as potentially productive in an "out licensing" context. The savings come from the elimination of management and maintenance costs.

Many firms including competitors will share technology access in complementary areas through "cross licensing" of rights. Ballard and Ford share technology rights in areas of their specific interest for example.

4. When does discounted cash flow apply to IP pricing?

The discounted cash flow (DCF) rate of return, sometimes referred to as the internal rate of return (IRR), can be a useful tool for valuing IP. The IRR is used frequently in finance, and is defined, in that context, as the rate of discount that makes the net present value equal to zero. For the purpose of valuing IP, however, the evaluator does not want the net present value to equal zero. The evaluator's objective is to obtain a value that reflects the risk-adjusted value of a series of cash flows over a period of time.

Recall that the standard discounted cash flow formula is:

$$PV = \sum_{t=1}^T C_t \div (1 + r)^t$$

Where:

C = cash flow

t = time

r = discount rate

The evaluator using this formula needs information on two variables:

- there must be some certainty as to the cash flows generated from the asset over time (C_t); and
- there must be a way of determining the appropriate discount rate (r).

Cash flows can be determined with greater certainty where the asset is long-lived, has a proven track record, and is functioning in a predictable environment. Discount rates are harder to determine, and, generally, require expert analysis. You can, however, discover discount rates with greater certainty

in low-risk environments. For example, discount rates for valuing real estate are generally around 10%, while discount rates for a new biotechnology are probably around 40%.

It is best to use the DCF method to price IP when the evaluator deals with long-lived assets with a demonstrated record of performance and when he/she operates in a low-risk environment.

5. **Describe the 25% rule for value estimation?**

This rule has, in various forms, been one of the most widely cited tools for pricing. When most managers talk about the rule, they actually use either of the following pricing methods:

- ◆ the royalty in \$ should be 1/4 of the money that the licensee *saves* by using the licensed subject matter; or
- ◆ the royalty in % of the net sales should be 1/4 of the *profit* before taxes that the licensee makes by selling the products of the licensed subject matter.

The “25% rule” is a reasonable standard if all the savings and profit actually result from using the licensed product. However, if the licensed product is part of a process in which several other products may contribute to the overall savings, the savings or profit may have to be discounted in some way before calculating the 25%.

Case Studies: Valuation

Case Study 1

Daniel is New Technology Inc.'s proposed licensee. New Technology Inc. has heard that their royalty should be 25% of Daniel's profit.

Q - Is this a reasonable standard?

Q - How does New Technology Inc. calculate profit?

Case Study 2

BIG University refuses to give any warranties for the IP it wishes to license to Fronrunner Technology. BIG simply does not want to face liability exposure that could affect its educational mandate.

Q - How will this refusal influence the value of BIG's technology?

Q - What should Fronrunner Technology do to protect itself against unreasonable risks?

Case Study 3

Go Industries is negotiating with SmallCo Inc., a small company trading on the Alberta Stock Exchange, for the transfer of Go Industries' IP to SmallCo Inc. in exchange for SmallCo Inc.'s shares (which are thinly traded on the market).

Q - What due diligence should Go Industries use to make sure it gets fair value by accepting shares rather than cash?

Case Study 4

New Technology Inc. has developed IP at a cost of \$500,000, and has decided to transfer it exclusively to Katrina. New Technology Inc. tells Katrina that her firm must recover the IP's costs.

Q - What should Katrina consider in order to correlate cost to value?

Case Study 5

Lionel has developed a computer game that would fit right into New Technology Inc. offerings of games for its new computer.

Q - Compare royalties based on the number of units sold vs. royalties based on the revenue generated by New Technology Inc.

Case Study 6

New Technology Inc. has an electric metering device that controls the consumption of electricity in hotels and restaurants. New Technology Inc. will control the production of the device that is protected by its patents.

Q - Discuss the merits of selling the units to the end user for a fixed amount.

Q - Also look at providing the units to the end user in exchange for a percentage of the savings realized by the end user (in addition, consider how New Technology Inc. might have to alter its tactics if licensing the technology to another manufacturer that then sold it to the end user).

Case Study 7

New Technology Inc. has highly specialized software that will appeal to a niche market. They will distribute the software through a reseller, Reseller Ltd., in exchange for 40% of revenues generated by Reseller Ltd.

Q - Compare the benefits to New Technology Inc. or Reseller Ltd. in basing the 40% on revenue received vs. revenue invoiced.

Q - Consider the effect of Reseller Ltd. sublicensing its rights to others.