

## **MET 2 LONG PROJECT 2006**

NURLIN MOHD SALLEH

### **Early Stage Company Valuation**

#### **Executive Summary**

This project examines the area of company valuation of early-stage technology and the methods used in practice from the perspectives of the buyers and sellers of the company. The results will vary as the buyer's aim is to determine the maximum price they are prepared to pay for the company being bought, whilst the seller's aim is to ascertain the minimum price that it should accept for its company. The perspectives considered for early-stage technology valuation were early-stage companies, large companies, business angels and government grants.

As a result of this study the following findings were discovered:

- Methods of valuation commonly used:
  - Discounted Cash Flow – is known to be inaccurate, yet is used mainly as a communication tool to justify investment
  - Rule of Thumb used by the business angels – 30-40% of the company is valued at the amount required for the next investment stage
  - Technical assessment of the technology
- Technology is often evaluated using the following criteria:
  - Market
  - Team management
  - Protection/ Defensibility
  - Product status: prototype or launched
  - Fit – resources and capabilities they personally had to offer
  - Revenue – business plan
- The most important factors buyers consider are the market need and size as well as the uniqueness of the technology
- Intellectual Property (IP) value is dependant on the technology itself and its lifecycle.
- IP is considered important to provide assurance of the company's freedom to operate

- IP is used mainly for defensive purposes and is not of high value to early-stage technologies as they are unable to defend it with their limited funds
- IP = Technology valuation during its early-stages, though the value of technology will increase with time as experience and knowledge is gained in a specialised area

The results from interviews and surveys have highlighted the importance of the intangible assets of a company, such as the value of brand, knowledge and technology. Many companies base their valuation of a technology on its characteristics using a set of criteria. Further research needs to be done to attempt to bridge the gap between the intangible perceptions and the tangible revenues of technology, to provide a more accurate view of its value in the long-term.

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## **1 INTRODUCTION**

### **1.1 Background**

Company valuation is used for a wide range of purposes, including mergers and acquisitions, valuations of listed companies and strategic decisions. The process of valuing a company also helps to identify sources of economic value creation and destruction within a company. The most common and accepted method of company valuation is to perform a financial valuation of the company's tangible assets. However, this is no longer satisfactory as there has been a growing awareness of the importance of intangible assets.

As we move into an information age characterised by increasing competition and shorter product life cycles, companies are becoming increasingly dependant on their intangible assets. These include the value in brand, technology, knowledge and Intellectual Property within the company. Valuation methods seldom consider these areas though they are highly likely to provide economic benefit to the company.

Early-stage companies have few if any tangible assets and their value lie within their capabilities, knowledge and reputation. Company valuation of early-stage technologies is considered to be a very difficult task and is an area of interest to be explored.

### **1.2 Aims and Brief**

The aim and value of this study (see Appendix A) is focused on the assessment of the different methods of estimating company value, when the company concerned is based on an early-stage technology. The project looks specifically at three possible streams of valuation: brand, knowledge and technology, and considers the importance of Intellectual Property.

The chosen focus on early – stage technology is due to the greater difficulty involved in valuation. There are higher risks associated and limited information available to perform accurate valuations.

The objectives of the project were:

- To identify different methods to value companies, looking specifically at knowledge, technology and brand valuation
- To identify ways to value IP assets looking from different perspectives – buyers, sellers, investors

- To compare technology valuation to IP valuation
- To investigate contribution of technology IP assets to the overall worth of the company in the long – term.

Deliverables produced at the end of the project were:

- A report on the motivation for funding early-stage companies and the methods of valuation or evaluation used from different perspectives
- Analysis of information and data gathered through interviews, highlighting areas of interest in the importance of intellectual property for early-stage companies
- A report on the importance of IP assets, and technology valuation to the overall future worth of the company
- Case study to analyse methods of valuation and evaluation of an early-stage company

The study was conducted during the period 20<sup>th</sup> March to 9<sup>th</sup> June 2006.

### **1.3 Acknowledgements**

I would like to acknowledge the help and guidance received from David Probert and Valerie Thorn. I would also like to thank the companies and individuals interviewed, who kindly gave their time and knowledge to assist in the development of this project.

### **1.4 Report Format**

This study provides insights in the area of early-stage company valuation. The report has been broken down in three parts. The first four sections of the report offers theoretical information gathered from books. This provides the reader with the basic information required, to understand the concept of valuation, and the areas of importance covered in this study. The following two sections discuss the analysis of interviews and surveys carried out during the course of the project. It aims to identify trends and attempts to gauge the importance of valuation, and the criteria required to perform them. The final section in the report provides case studies of the valuations identified during the interviews, and the comparison of its results. Analysis of the methods used will provide information on the accuracy of valuations used in practice.

## 1.5 Definitions

### Valuation

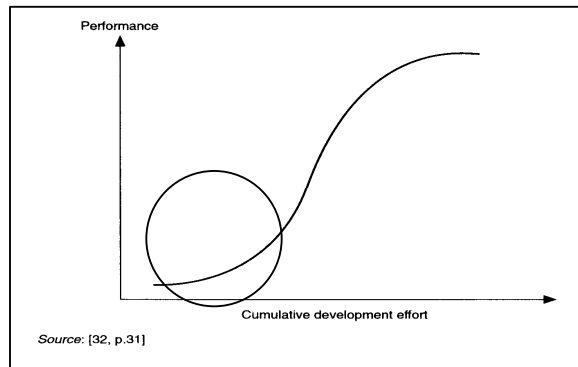
- “Is essentially the bringing together of the economic concept of value and the legal concept of property”
- Value should not be confused with price, which is the quantity agreed during negotiations between the buyer and the seller

### Intellectual Property

- “Term often used to refer generically to property rights created through intellectual and/or discovery efforts of a creator that are generally protectable under patent, trademark, copyright, trade secret, trade dress or other law”  
[www.techtransfer.umich.edu/index/glossary.html](http://www.techtransfer.umich.edu/index/glossary.html)

### Early stage technology

- Technology that has not yet been fully commercialised. Is considered to either be an untested idea, a bench-top or prototype technology.



## 2 Company Valuation

### 2.1 Reasons for Company Valuation

Company valuation is a process used to determine the value of the company. It often combines objective and subjective considerations.

Company valuations are performed for a wide range of purposes:

- Mergers and Acquisitions
- Licensing purposes
- Valuations of listed companies – used to make comparisons between companies
- Public offerings
- Identification of value drivers within the company
- Strategic decisions and planning – helps to identify areas of value creation and destruction within a company

## **2.2 Methods of Valuation**

There is no right method of valuation. The valuation methods used is dependant on the purpose of the valuation, the information available, and the party interested in valuing the company.

There are three general methods of valuation:

- Cost Approach
- Market Approach
- Income Approach

When valuing a company, there is no right answer. Most valuation methods are considered wrong or inaccurate due to their various limitations. It is considered useful to perform a number of valuations using different methods to ensure accurate results.

### **2.2.1 Cost Approach**

This approach looks at valuation whereby a buyer will calculate value based on his or her projected cost to re-create the company. This includes costs to organise personnel, obtain leases, obtain fixed assets, costs to obtain intangible assets such as licenses and copyright, etc.

The disadvantage of this method is that it does not take into account the future value of the company. This approach does not directly consider the amount of economic benefits that can be achieved or the time period over which they might continue. Secondly, some companies require little investment and fixed assets to be of high value, for example, Hotmail, whose growth and success could be attributed to its novel concept and method for promotion – virus marketing.

### **2.2.2 Market Approach**

The market approach considers recent transactions involving valuations of similar companies. Valuations of similar companies are analysed and adjusted to provide a value to the company under consideration.

The value of the business can also be estimated through comparisons of its performance to that of similar businesses using one or more performance ratios:

- *Price/ Earnings Ratio* – the basic benchmark for shares in listed companies, and allows the company value to be calculated from its profit

- *Enterprise Value/ EBITDA Ratio* – Enterprise Value = Equity + Debt; EBITDA – Earnings Before Interest, Tax, Depreciation and Amortisation is the profit resulting directly from the business operation
- *Enterprise Value/ Sales Ratio* – is easy to calculate and is a performance measure that does not depend on the operating costs of the business

The disadvantage with this approach is whether or not the comparative companies are truly comparable with the company being valued. It is usual practice to consider a range of comparative businesses in hopes of obtaining a reasonably accurate value.

### 2.2.3 Income Approach

The income approach is based on the income-producing capability of the company. This considers the future value, or the economic benefit that the company can provide.

There are many methods that can be used:

#### ❖ *Discounted Cash Flow*

This method is a means of converting future cash payments into their present equivalent value using the following equation:

$$NPV = C_0 + \frac{C_1}{(1+r)} + \frac{C_2}{(1+r)^2} + \dots + \frac{C_n}{(1+r)^n}$$

NPV = Net Present Value

$C_0, C_1, C_2, \dots, C_n$  = series of cash returns received each year for years 0, 1, 2,...n

Cash returns can be positive (income) or negative (payments)

$r$  = discount rate

**Example:** A product license is agreed from an upfront payment of £10k, and annual royalties of 5% sales income for 4 years. What is the NPV of this license at a discount rate of 10%?

	Year 1	Year 2	Year 3	Year 4
<b>Sales £k</b>	20	30	40	50
<b>5% Royalty (=P)</b>	1.00	1.50	2.00	2.50
<b>Discount Factor =<math>(1+0.1)^n</math></b>	1.10	1.21	1.33	1.46
<b>Present Value =<math>P/(1+0.1)^n</math></b>	0.91	1.24	1.50	1.71

$$NPV = 10 + 0.91 + 1.24 + 1.50 + 1.71$$

$$= \text{£}15.36\text{k}$$

**Figure 1 - Example of DCF** (Source: *Captum Masterclass Booklet*)



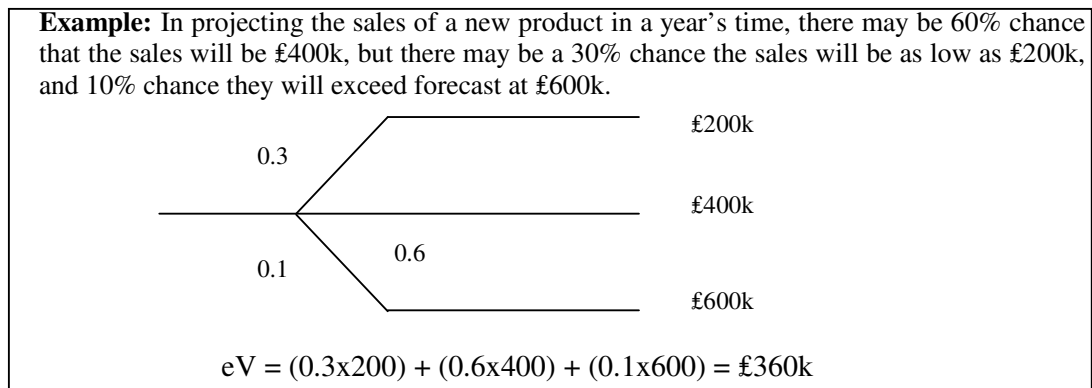
This method is dependant on the timing, magnitude and risk involved with such future payments. The NPV valuation is only as real as the discount rate chosen. There are several methods used to determine an appropriate discount rate:

- ✓ Bank Lending Rate
- ✓ Cost of Capital – Weighted Average Cost of Capital is calculated to recognise the ratio of debt to equity
- ✓ Hurdle Rate – often set by large corporations and venture capitalists

The limitation is that the valuation is only as reliable as the accuracy of the cash flow forecasts. Prediction of macro and micro economic issues for future years cannot be performed with any degree of certainty. The uncertainties can possibly be addressed by performing a Sensitivity Analysis on the NPV.

❖ *Risk Adjusted Net Present Value*

The Risk Adjusted Net Present Value of a projected series of cash flows takes into account the probability of success or failure. This helps to alleviate the uncertainties in projecting future cash flows.



**Figure 2 - Example of Risk Adjusted NPV** (Source: Captum Masterclass Booklet)

The limitation is that this method is dependant on the values P, C and r, where P is the probability of the cash flow in that year. The value of P is also fairly difficult to determine.

❖ *Scenario Models*

This valuation approach is to measure the risk by combining values under Probable, Best and Worse Case combinations of parameters.

**Example:** A development project is in progress that has cost £10m to date. In deciding whether or not to continue the project, estimates are performed.

£000s	Worst	Probable	Best
Cost to Date	10.0	10.0	10.0
Future Cost	25.0	20.0	15.0
<i>Total Cost</i>	35.0	30.0	25.0
Gross Profit	21.3	39.2	64.6
Net Profit	-13.7	9.2	39.6

**Figure 3 - Example of Scenario Models** (Source: Captum Masterclass Booklet)

The limitation with this method is that it does not give any indication of the probabilities of the scenarios occurring.

#### ❖ Monte Carlo Simulation

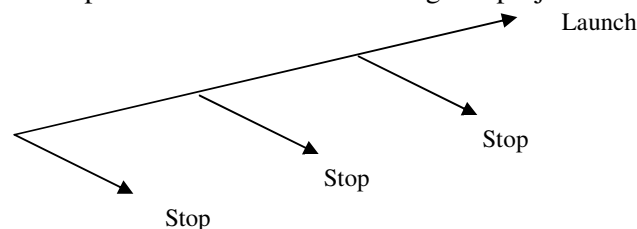
The Monte Carlo simulation of a valuation model randomly generates a range of values for uncertain parameters within a defined range and probability distribution. By using 1000 combinations of the uncertain parameters, the software can perform calculations of the NPV over and over again to create a distribution of NPV outcomes that can be analysed and interpreted. This method is useful as it can be widely applied to uncertain decision situations.

The limitation of using this method is that it does not consider the probabilities of the outcome occurring, and does not take into account the possibility of abandoning the project at a later time.

#### ❖ Real Options

A real option value is the value of the right but not the obligation to make an investment in a potentially valuable project. This project is usually inherently risky, e.g. R&D projects, investments in early-stage companies.

**Example:** Development of a new drug goes through several stages from pre-clinical, Phase1, Phase2, Phase3, Regulatory Approval before it is launched. The model below illustrates three of these stages with the option to abandon the project after each stage. The eNPV of the Real Option can be calculated using the projected costs and probabilities of each stage.



**Figure 4 - Example of Real Option Value** (Source: Captum Masterclass Booklet)

The Real Options method is useful as it recognises the step-wise nature of new ventures, and it allows the flexibility of expanding or abandoning investments that other methods have not answered. However, this method is difficult to understand, which has limited its use.

### 3 Technology, Brand & Knowledge Valuation

Valuation of a company can consist of three possible value streams, brand, knowledge and technology. These areas may be of particular interest to early-stage companies whose value could be based on their expertise, experience and reputation. Each of the three areas is explored further to better understand the difficulties associated with valuation.

Asset	Valuation Method				
	Excess Operating Profits	Cost Savings	Royalty Savings	Market Approach	Cost Approach
<b>Brands</b>	X		X	X	
Customer Lists				X	X
<b>Patents</b>	X	X	X		
<b>Know how</b>	X	X	X	X	X
Franchises				X	X

**Table 1- Common methodologies for valuing frequently encountered intangible assets** (Source: *Valuation of IP, PricewaterhouseCoopers*)

#### 3.1 Brand Valuation

Brand is defined as... ‘a name, term, sign, symbol or design, or a combination of them which is intended to identify the goods or services of one seller to differentiate them from those of competitors.’

*Philip Kotler, ‘Marketing Management’*

... ‘A product is something that is made in a factory; a brand is something that is bought by a consumer. A product can be copied by a competitor; a brand is unique. A product can be quickly outdated; a successful brand, properly managed can be timeless.’

*Stephen King, ex-Head of Development at JWT*

What gives a brand a definite value is that it is a defensible piece of property which represents a secure flow of earnings. Brand valuers have stressed that a brand name has no reliable value unless it has some form of legal protection, and some use in-house trademark lawyers to verify this before attaching any value to a brand.

As mentioned previously, see (Section 2.2), there are many different ways to reach a valuation, and each are appropriate in certain circumstances. The most common approaches used to value brand are:

– *Cost Based*

Valuing a brand on the basis of what it actually costs to create or what it might theoretically cost to recreate. However, this method is of little use in expressing the current value of any brand, because by definition, unique brands cannot be recreated easily. Also in the case of many brands, the actual cost of creation may have been very low where the ultimate value is very high.

– *Market Based*

This approach is based on the assumption that there are either comparable market transactions (specific brand sales) or comparable company transactions (the sale of specific branded companies).

This method is difficult to perform as few companies or divisions operate with one brand alone, so it is virtually impossible to separate out the brand to be valued. Additionally, brands by their very nature are not comparable nor are they replicable.

– *Income Based*

The three most frequently used methods are:

1. *Royalty Relief Method* – this approach is based on the theoretical assumption that an operating company owns no brands and needs to license them from a non-operating brand owner.
2. *Discounted Cash Flows* – (see Section 2.2.3) is very sensitive to both the cash flow forecasts up to the horizon year and to the discount rate.
3. *The Earnings Multiplier Approach* – brand values are estimated by multiplying base year incremental brand earnings by an appropriate multiplier.

One of the main problems associated with brand valuation is to isolate the value of the brand from the value of the other assets (tangible and intangible) used to produce the product or service. This can be accomplished by (i) Price Premium – valuing the premium profit generated by a branded product over a non-branded product; (ii) Royalty Payments or Royalty Relief; (iii) Brand earnings/ alternative return on assets method.

Other valuation methods include:

❖ *Interbrand approach*

This approach represents an attempt to formalise the link between the brand's characteristics and the discount ratio to be applied.

The brand is scored on the basis of seven brand strength factors:

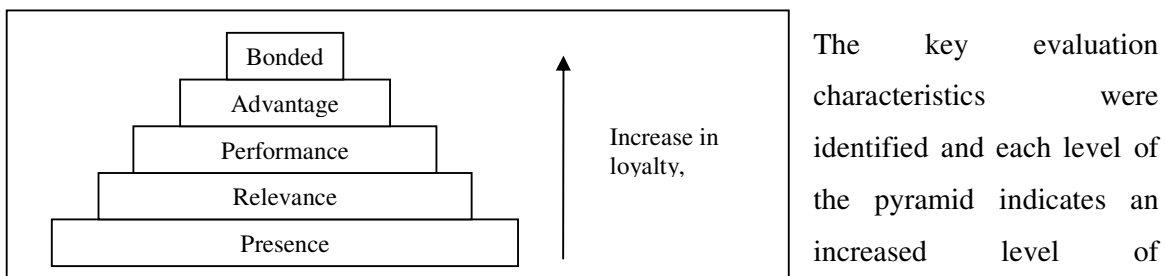
1. *Market* – high tech or clothing market is more vulnerable to technological or fashion changes
2. *Stability* – long established brands which command consumer loyalty are of high value
3. *Leadership* – a brand which leads its market is generally a more stable and valuable property
4. *Trend* – the overall long-term trend of the brand is an important measure of its ability to remain relevant to customers
5. *Support* - brands that have received consistent investment and focused support have higher value
6. *Geographic Spread* – brands that have international acceptance and appeal are stronger than national or regional brands
7. *Protection* – the strength and breadth of the brand's protection is critical in assessing its overall strength. If the legal basis of a brand is suspect, it may not be possible to apply a value to the brand at all.

These scores are then weighted together to produce an overall 'brand strength' score, and the appropriate discount rate is determined from an 'S-curve' which plots the relationship between brand strength scores and earnings multiples. The brand value is calculated by applying the appropriate discount rate to the expected future brand cash-flows.

❖ *BrandDynamics Pyramid*

This approach was used to attempt to bridge the gap between the intangible perceptions of the brand and the tangible revenues generated from it.

**Figure 5 - The BrandDynamics Pyramid**



familiarity and involvement with a brand. In order to understand the areas of strength and weakness in the brand, it is necessary to construct a relationship profile of the

brand against others in the same category. Using this as a comparison method, the brand value can be obtained.

Brand Valuation may not be applicable to this study, as early-stage technology would have little value in this area. However, it has highlighted the importance of evaluation, especially that of protection, and the understanding of the benefits of the consumer perception.

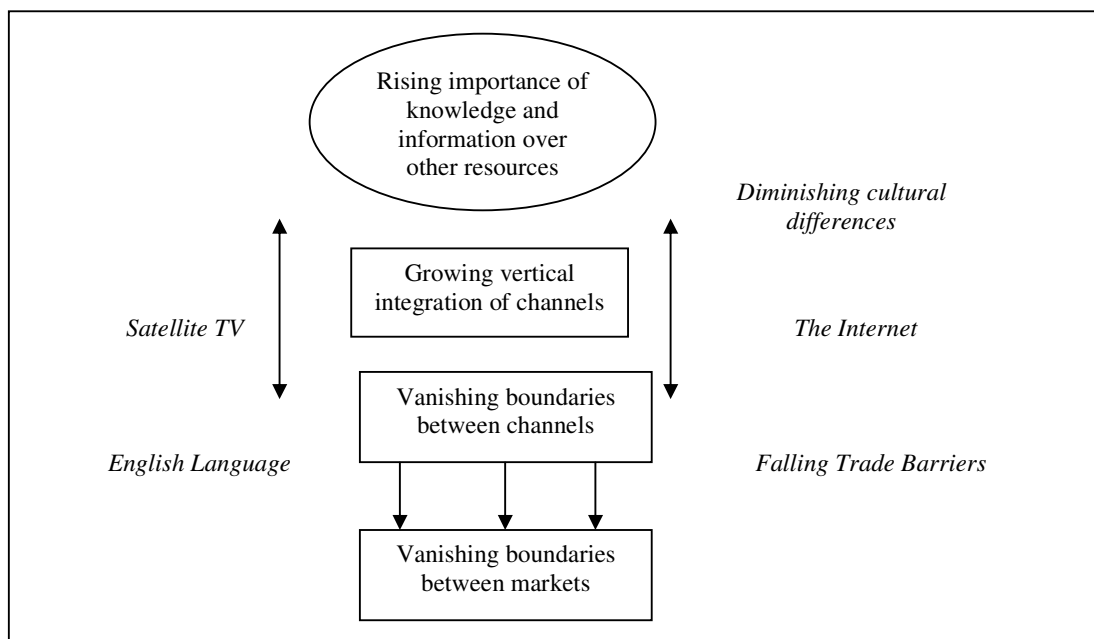
### 3.2 Knowledge Valuation

“Knowledge has become the key economic resource and the dominant source of comparative advantage.”

*Peter Drucker, ‘Managing in a Time of Great Change’.*

“We’re very much moving into a knowledge-based economy and the proper measuring and accounting of assets that create wealth in a knowledge-based economy is critical. It is the whole underlying foundation of our economy going forward.”

*Steven Wallman, former Commissioner, US Securities and Exchange Commission*



**Figure 6 - Growing Importance of Knowledge** (Source: 'From know how to knowledge'; Bryan Gladstone)

The value of knowledge is becoming increasingly important as goods in the new economy become more intangible and 'lighter'. There is a widening gap between the market and book value of companies due to hidden assets such as know-how, public values, information systems and reputation that are not given due consideration using existing measurements. Most companies are saying that – “Knowledge is the company’s most critical resource”, as is

reflected in the survey completed by companies in the US and Canada on the factors important for overall business success shown below.

US		Canada	
1) Product Reputation	8.40	1) Information Systems	8.41
<b>2) Employee know how</b>	<b>8.38</b>	<b>2) Employee know how</b>	<b>8.27</b>
3) Information Systems	8.28	3) Product reputation	8.04
4) Company Reputation	8.03	4) Company Reputation	7.97
5) Databases	7.80	5) Databases	7.88
6) Statement of corporate values	7.50	6) Supplier know how	7.43
7) Statement of strategic goals	7.44	7) Statement of strategic goals	7.37
8) Statement of corporate ethics	7.20	8) Statement of corporate values	6.99
9) Supplier know how	7.16	9) Statement of corporate ethics	6.63
10) Research / Tech Sector	6.96	10) Distribution know how	6.56

**Figure 7 - Factors for overall business success** (CA Magazine, Canadian Institute of Chartered Accountants, April 1997)

Valuing knowledge by using the cost of regenerating the information or buying comparable information gives vastly different figures. Some methods in use are:

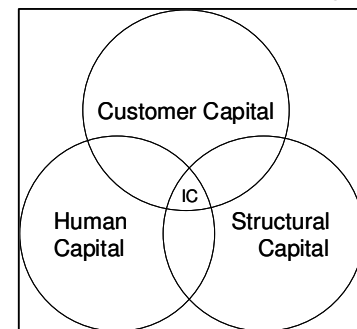
#### ❖ IC Measurement System

Customer Capital – value created in the market place, e.g. breadth and depth of customer relationships, patents, brands.

Human Capital – knowledge and skills of the individual; the most important but the most mobile.

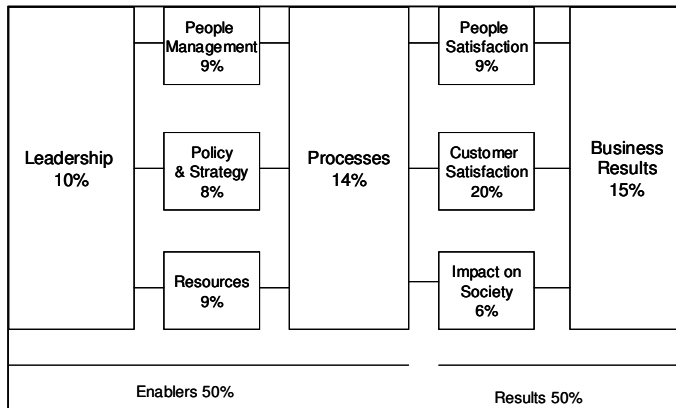
Structural Capital – the organisational processes, database, trademarks.

**Figure 8 - IC Diagram**  
(Source: Charles Armstrong,  
Leif Edvinsson, Gordon  
Petrashand Hubert Saint-Onge)



“Measurements are put into a hierarchical chart with weightings consistent with our purpose, value, and strategies so that progress can be measured. They are put into a consolidated software application and rolled up through the organisation to provide a single composite measure of performance.”

Charles Armstrong

❖ *European Foundation for Quality Management (EFQM)*

**Figure 9 - EFQM Model** (Source: 'Measuring the Value of Knowledge', David Skyrme)

This method of valuation considers customer-focused and employee measures.

There are other methods not brought up here including, the Balanced Scorecard approach and the Information Health Index. The valuation of knowledge is generally performed using evaluation methods of comparison using certain criteria.

This area is of interest to this study, as an early-stage company may have value in the know how and expertise of its people. The technology itself may be considered of little value if there is a lack of understanding of its purpose and usage.

### 3.3 Technology Valuation

*“Technology”* – the comprehensive bundle of patents, technical trade secrets, proprietary technical know-how, and/or proprietary hardware/ software required to support the business made possible by the practice of that comprehensive bundle of technology.

*Mildred A. Hastbacka, Technology Management Journal*

The technology can often form the core of the company, thus there is a definite need to value it in order to value the company as a whole. A large number of early-stage companies require external funding to enable growth from investors such as Business Angels, Venture Capitalists and larger Banks. Technology valuation is also used for licensing, selling businesses and products, R&D project evaluation and portfolio management.

The factors affecting technology value:

- Nature, form, and stage of development of the technology – the less developed a technology is, the more risky it is.
- Perceived technical risk
- Perceived commercial risk
- Economic impact and useful economic life



- Transaction-specific details
- IP Protection – the extent and strength of the IP are dimensions of a valuation, it is considered necessary but is not a sufficient condition for value to exist.

The importance IP plays in the valuation of technology is discussed later (see Section 4.4).

Valuation method	Advantages	Disadvantages
<b>Cost Approach</b>	✓ Simple	<ul style="list-style-type: none"> <li>✓ Cost bears little relation with the potential benefits of the technology</li> <li>✓ It is often difficult to make accurate cost estimated</li> </ul>
<b>Market Approach</b> (Ranking/ Rating Method, Industry Standards Method)	✓ Simple and based on actual transaction data	<ul style="list-style-type: none"> <li>✓ Limited data available: transactions involving transfers of technology are relatively infrequent, and usually not made public</li> </ul>
<b>Income Approach</b> (Risk Adjusted Hurdle Rate)	<ul style="list-style-type: none"> <li>✓ Based on economic benefits derived from owning/ using the technology</li> <li>✓ Reflects full effect of risks associated with the technology</li> </ul>	<ul style="list-style-type: none"> <li>✓ Subjectivity: based on anticipation of future income. Early-stage technology has no historical data.</li> </ul>

When considering the focus of this study on early-stage technology, the market-based and the cost-based approach would not be suitable as the technology is unique and novel with few comparables in the market.

There is greater uncertainty in valuation of technologies. Therefore, the hurdle rate is adjusted to reflect the added risks involved to be used in the DCF method (see Section 2.2.3).

Characterisation of risk	Approximate RAHR (r value)
“Risk free”	10-18%
Very low risk – incorporating a new but well-understood technology into an existing product	15-20%
Low risk – making a product with new features using a well understood technology	20-30%
Moderate risk – making a new product with well-understood technology in an existing market	25-35%
<b>High risk – making a new product using a not well-understood technology to an existing market</b>	<b>30-40%</b>
<b>Very high risk – making a new product with a new technology to a new market</b>	<b>35-45%</b>
<b>Extremely high risk – startup company going into the business of making a new product using unproven technologies</b>	<b>50-70%</b>

**Table 2 - Approximate Values of Risk-Adjusted Hurdle Rate used in licensed negotiations** (Source: *Early Stage technologies, Richard Razgaitis*)

Investment in early-stage technology has a very high risk involved, which attributes for the use of higher discount rates for income-based valuations. The project investigates further, the use of valuation methods used in practice for early-stage technology (see Section 5: Company Valuation from different perspectives).

The importance of intellectual property (IP) of knowledge, brand and technology has been highlighted in this section. The lack of protection and the uncertainty about the breadth and strength of the protection, could lead to difficulties in valuing the company. This area of investigation is explored later in the report (see Section 4). Another area of interest of this study is the comparison between technology and IP valuation, and the inherent differences between them that shall be discussed later.

## **4 Intellectual Property Valuation**

Intellectual property (IP) assets may help to strengthen the case for obtaining business finance from investors. The investor will assess whether the new or innovative product or service offered by the company is protected by a patent, a utility model, a trademark, an industrial design, or copyright or related rights. Such protection is often a good indicator of the potential of the company for doing well in the marketplace. There is an increasing reliance on IP assets as a source of competitive advantage for companies. This area of study is focused on the importance of IP valuation and discusses the separability of IP from technology valuation.

### **4.1 IP Definitions**

“Intellectual properties refer to the creations of the mind: inventions, literary and artistic works, and symbols, names, images and designs used for business purposes”

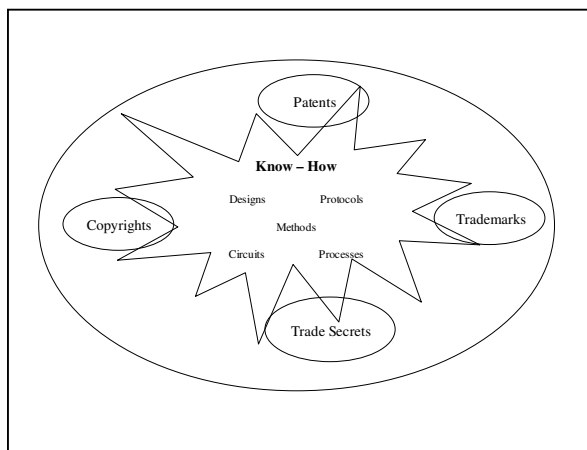
*Petersson, H., ‘Venture Capital Firms and Intellectual Property’*

Intellectual properties are intangible assets and consist of:

- *Patent*
  - ✓ The legal process whereby technology is turned into controllable property with defined rights associated with ownership
  - ✓ Must be novel, applicable and useful
- *Copyright*
  - ✓ The owner has exclusive rights to produce copies and to make the work public
  - ✓ Protects the expression of an idea and commences from the time the expression is fixed in some tangible form
- *Trademark*
  - ✓ A unique sign which identifies certain goods or services as those produced or offered by a particular person or company
  - ✓ Extremely valuable to a business, is long-lived, powerful and delicate

- ✓ Brand is considered in this area, however, brand is a marketing concept that differs from the strictly legal concept of trademark
- *Trade Secrets*
  - ✓ “...any information not generally known in the trade. It may be an unpatented invention, a formula, pattern, machine, process, customer list...or even the news”
  - ✓ Must be used in the business, provide its owner with some competitive advantage and be treated as secret

These assets fall into two broad categories: the legally protected assets, such as patents, and the assets like know-how that are closely held in the minds of individuals and groups.



**Figure 10 - IP categories** (Source: ‘Developing an Effective Strategy for Managing Intellectual Assets’)

## 4.2 Importance of IP

As we move into an information age characterised by increasing competition and shorter product life cycles, companies are becoming increasingly dependant on their intellectual properties (IP). IP can provide value to the company in two instances: (i) to create value in the form of licensing to generate an income, or (ii) to enable value in the form of protection or infringement from competitors, or in the form of the legal right to secure a sufficient return.

The importance of IP and the need to value it is increasingly being recognised. “In the UK 90% of small enterprises are in the service sector...and their assets primarily consist of intellectual property”, Jarvis, R., ‘Seeing the invisible’. Ove Granstrand claims that “Intellectual property has become an area of strategic concern for corporate management and technology management within leading companies”.

Valuation of IP, technologies and products can generate awareness and value to the company by helping them to: (i) choose between market opportunities, (ii) more effectively protect and leverage the IP portfolio and important technology, (iii) identify areas of value and revenue

opportunity, (iv) better utilise the IP portfolio through various avenues such as licensing, (v) justify a return on investment for technology and patents and (vi) reflect overall company value more accurately on financial statements.

#### 4.3 Methods of Valuation

The preference for the valuation method used is in ascending order, with the income method being the most favourable:

- *Income method*

This method is commonly used for new technologies when comparables are not available and the enabled market is sizeable. To use this method effectively, income statements must be projected for the life of the technology and an appropriate discount rate applied that reflects the high risk involved. Early-stage valuation is dependant on the question of when the earnings will begin and considerations must be given to fixed assets that need to be put in place.

- *Market comparables*

Value of IP is determined by comparison with sales or licenses of similar IP or technologies. However, unusual IP or disruptive technology portfolios do not have comparables.

- *Cost based*

Asset is valued at the cost of producing the asset, cost of obtaining a substitute, or the benefit of introducing the product to the marketplace sooner. However, equating cost with value is not accurate and significant adjustments are required to account for market conditions, technical risk, obsolescence and buyer/seller motivations.

	Trade Secrets	Copyrights	Patents	Trademarks
Cost Approach	X	X		
Market Approach		X		X
Income Approach		X	X	X
Real Options			X	
Econometric Models			X	

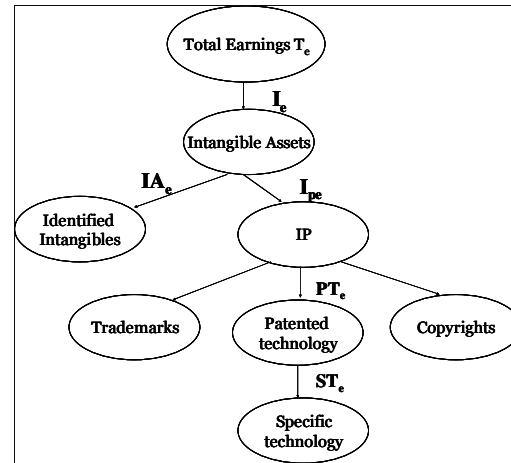
**Table 3 - Applicability of IP Valuation Methods** (Source: 'Valuation of IP' Presentation Slides; Christopher M. Kalanje)

#### 4.4 Comparison to technology valuation

Technology rights are usually expressed in the form of Intellectual Property: patents, trade secrets and copyrights. When valuing technology, IP protection is assumed to exist, although the valuation will be dependant on the strength and breadth of the protection. One method to

consider in technology valuation is shown in Figure 11. This method allows us to isolate the income associated with one element of the intellectual property through a subtractive process. However, this is easier said than done. Costs associated with each element of Intangible Assets and IP is difficult to determine.

The question that needs to be addressed looks at the issue of comparability between the valuation of IP and that of technology. Is technology solely associated with its patents, and the strength of this protection ( $PT_e = ST_e$ ), or is the technology of greater value to that of the IP ( $ST_e > PT_e$ )? If the latter, therefore the figure is inaccurate and does not portray the true value of technology that includes factors such as know-how and technology management. This similarity between technology and IP valuation is largely dependant on the use and management of IP in the company strategy. This area of study is investigated further (see Section 5).



**Figure 11 - Allocation of Earnings Among Intangible Assets** (Source: 'Valuation of Intellectual Property and Intangible Assets')

## 5 Company Valuation from different perspectives

A company's value varies for different buyers and also for different buyers and sellers. The buyer's aim is to determine the maximum price they are prepared to pay for the company being bought, with the insight to the potential contribution to the business' future value. The seller's aim is to ascertain the minimum price that it should accept for its company. However, the bottom line is that a business is worth what a buyer is willing to pay for it.

This study considers the methods of valuation performed in practice by buyers and sellers of early-stage companies and technologies. Information was gathered through the use of interviews (see Appendix B & D) with individuals with different perspectives on valuation:

- Early-stage companies
- Large companies
- Business Angels

The purpose of the interviews was to gain information about: (i) the different types of valuations used in practice, (ii) the criteria used for technology evaluation, (iii) the perception of the value of the IP, (iv) the views on the difference between technology and IP valuation.

## 5.1 Early-stage companies

### *(I) Valuations used*

The general view shared by most of early-stage companies are that, at this stage in the company, valuation has more to do with guesswork. The value of the company is considered to be what a buyer is willing to pay for it.

The most common valuation method used is Discounted Cash Flow (DCF), though this is not considered to be very accurate. The DCF method is used as a means of communication, as it is widely recognised. This method is only used as a start-up in attempting to value the company.

Another method commonly considered was through the calculation of cost incurred to reach the next stage of development of the technology. The value of the company was considered at a multiple of the future costs.

Therefore, it was found that the valuation of early-stage companies is usually very subjective, and is dependant on the amount the buyer is willing to spend. Secondly, the value is considered to be the investment required by the company, and the DCF method is adjusted to justify this.

### *(II) Criteria to evaluate technology*

The companies interviewed felt that most decisions they made concerning the evaluation of the technology was through judgment and gut-instinct. The factors considered in the decision process were:

- ✓Intellectual Property
- ✓Proof-of-concept
- ✓Management team
- ✓Market sizes
- ✓Product enablement
- ✓Commercial partnerships.
- ✓Product status: prototype or launched
- ✓Fit – resources and capabilities they personally had to offer

✓Technically interesting

### *(III) Importance of IP*

Early-stage companies had varied opinions concerning the importance of IP. Some felt that IP had no value and little purpose, due to the fact that the lifecycle of the technology was too short to warrant an application of a patent. Secondly, the costs required to defend the patent was too large an expense for a company with little cash flow.

Others felt that IP was critical, as it could be used to obtain investment from venture capitalists and multinationals. However, to defend the patent would require the support of a large partner. The value of IP is considered to be of importance when it has a commercialisation purpose.

The differences in opinion could be attributed to the differences in company strategy, market and the technology itself. The companies involved in markets with a short technology lifecycle gave little importance to the value of IP, in comparison to a company whose technology is disruptive with the potential of a lifecycle of 50 years.

### *(IV) Comparison of IP and technology*

The general opinion from early-stage companies was that during the early-stages of a technology, the valuation of the IP equals to the technology itself. It is felt that as the technology is further developed, the experience and knowledge will increase and add competitive advantage.

## **5.2 Large Companies**

### *(I) Valuations used*

The large companies interviewed, concentrated their efforts mainly on evaluating the technology. The valuation is based purely on technical assessment rather than financial. Any financial valuations performed, used the DCF method with probabilistic risks involved, and through consideration of the likely scenarios that could occur in the business.

### *(II) Criteria to evaluate technology*

Different companies have different means to evaluate the potential of a technology.

Factors that had been frequently mentioned in the interviews were:

- ✓ the importance of a project champion, with the belief to drive the project forward
- ✓ the use of a technology roadmap at a high level, to use as a guide to consider technologies
- ✓ the quality of the management team

The first stage in evaluating technology is through the gathering of data on the different technologies available and filtering on the basis of strategic fit. The technologies would then be assessed through a series of questions that are answered using an individual's judgment, looking at:

- ✓ the technology
- ✓ economic issues
- ✓ political issues
- ✓ the market potential
- ✓ uniqueness of the technology
- ✓ Technology Life Cycle / Technology Readiness Level
- ✓ Revenue – business plan
- ✓ Protection
- ✓ Technical feasibility

The technology is then assessed using a scoring system to see if it meets the criteria set.

Large companies are reducing internal research & development expenditure, and concentrating more efforts on an external focus. Therefore they are attempting to improve the management of their technologies through the implementation of a stable and standard process to evaluate technology.

### *(III) Importance of IP*

The importance of IP varies depending on the company strategy. Most of the companies considered the IP protection and its defensibility during the process of evaluation of the technology. Companies preferred that the IP was owned by the business on clear terms.

### *(IV) Comparison of IP and technology*

Technology is not considered to be equated to only the IP. Other factors such as the business model, market need and know how of the technology, is important as well and should be given consideration.



### 5.3 Business Angels

#### *(I) Valuations used*

Business Angels do not use any of the traditional valuation models discussed earlier in the report. Rather, valuations are performed on the basis of the amount required for the next investment stage, or the next milestone to increase the value of the company.

Some business angels stated that most founders of early-stage companies prefer to keep 50% share of the company. Therefore the valuation could be considered the amount required for the next stage of investment at 50% share of the company.

Another rule of thumb is that 30-40% of the company is valued at the amount needed for the next stage of the investment. Therefore, the total value of the company is equal to twice the amount you are trying to raise.

#### *(II) Criteria to evaluate technology*

Most decisions for evaluating the potential of technology is based on judgment, though calculations are used to justify the investment. Technology is evaluated using criteria:

- ✓ Market – most important factor, if you do not know where it can be used, then its worthless
- ✓ Team – reasonable management
- ✓ Defensible Technology – IP, brand, know how
- ✓ Conforms to international standards
- ✓ Technology has a reasonable chance of working
- ✓ Believable Plan – marketing, sales, business
- ✓ Financials – 60% IRR
- ✓ Company running for 1 year
- ✓ 3<sup>rd</sup> party endorsement – to show people have looked the company and done due diligence

#### *(III) Importance of IP*

The importance of IP is dependant on the technology. Some technologies such as those related to pharmaceuticals have a long lifetime therefore, the IP is critical. However, others such as software, IP has little purpose and value.

IP is considered to have little value to early-stage companies, as they would be unable to defend their technology when their patent is infringed upon, due to the lack of necessary funding. The infringement could occur without the company's knowledge. Secondly, the

technology can become obsolete before the patent has been accepted, due to the short lifecycle of the technology. Competitors can possibly find another method to perform the technology.

Patents are not considered to be of importance, as they are used for defensive purposes rather than offensive. Their value is only to show that the company has the freedom to operate and does not infringe on the IP of others.

*(IV) Comparison of IP and technology*

Business angels believe that technology has greater value than the IP because technology includes what the management chooses to do with the IP. The company exploits the technology around the IP that provides protection from competitors.

Another view to consider is that the IP and technology itself is of little value. They make up the idea of the company, yet the real value is found in making it work and selling the product. Therefore, the success in the marketplace is of greater importance.

#### **5.4 Government Grants**

The government bodies, such as, the Department for Trade and Industry, provide grants for research and development to assist small and medium-sized businesses in the UK to research and develop technically innovative products. Early-stage companies frequently apply for grants to obtain funding, and business angels occasionally do not provide funding until the company has been provided with a 3<sup>rd</sup> party endorsement such as a grant.

Criteria used to assess the proposal:

- the quality and novelty of your proposal
- whether the grant is essential for you to proceed with the project
- the financial viability of your business and the project
- the qualifications and experience, in both R&D and business, of the project leader and team
- the significance of your project and its potential
- commercial benefit to the European Economic Area
- the means proposed for turning your idea into a commercially successful product or process

### **5.5 Discussion of findings**

The interviews provided interesting information concerning the differences and similarities between the different individuals. It seems that valuation of early-stage technology is based mainly using rules of thumb and judgment, whilst performing the DCF as a means of communication and justification.

The main factors for evaluating technology are to consider the market, as well as the quality of the team, and the value of a project champion was also highlighted.

The importance of IP is varied, and is highly dependant on the technology and company strategy. IP is considered important to obtain funding and for commercialisation purposes, yet there is little value for early-stage companies as they are unable to defend their rights if the IP is infringed.

IP is considered to be equal to the technology in its early stages. However, as the technology is developed and experience and knowledge is gained, the value of the technology increases. The technology becomes of greater value due to management and the business model.

## **6 Technology Evaluation**

### **6.1 Ranking/ Rating of technology evaluation**

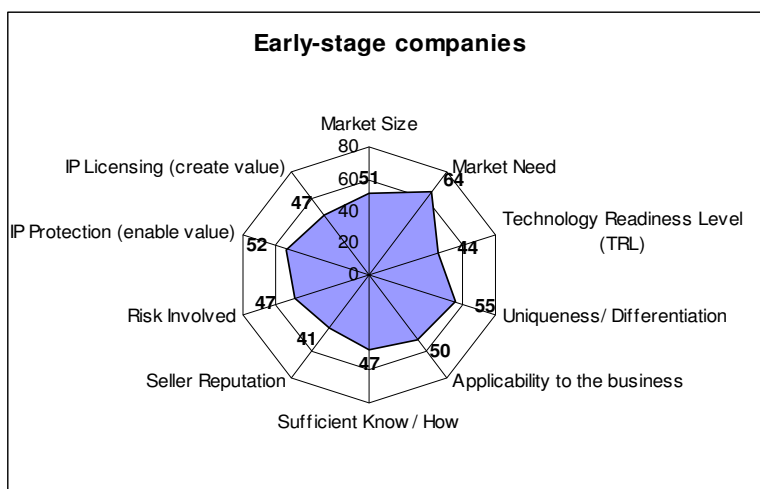
Valuation of early-stage technology is more an art than a science, and is a very subjective process. Technology is often evaluated using a set of criteria, and the decision to invest is based on judgment of the potential of the technology. A questionnaire was circulated amongst members of early-stage companies, large companies, business angels and investors, to attempt to identify which factors are of importance when evaluating the potential of technology (see Appendix B). They were asked to rate the following factors:

- ✓ Market Size
- ✓ Market Need
- ✓ Technology Readiness Level (TRL)
- ✓ Uniqueness/ Differentiation
- ✓ Applicability to the business
- ✓ Sufficient know how
- ✓ Seller reputation
- ✓ Risk involved
- ✓ IP – protection (enable value)
- ✓ IP – licensing (create value)

The results in each category were collected on a spreadsheet (see Appendix E). Factors that had not been included in the questionnaire that had been mentioned as important are management of the team, and project champion.

## 6.2 Analysis

### ❖ *Early stage companies*

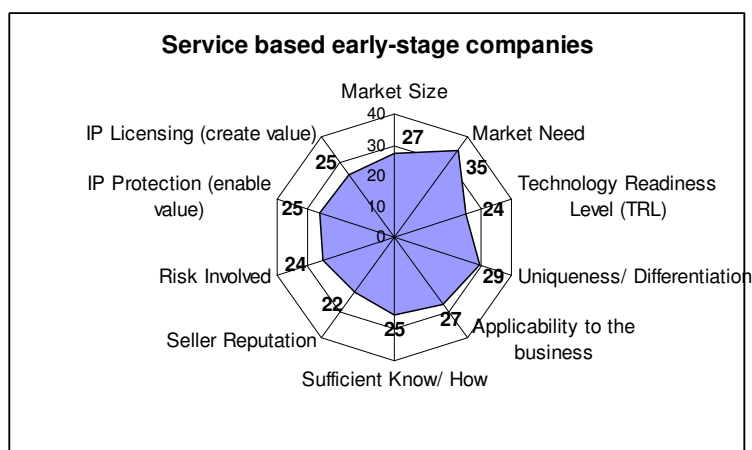


**Figure 12 - Results for early-stage company criteria for technology evaluation**

Figure 12 shows the results of the questionnaire. Early-stage companies seem to consider the market need to be the most important factor when evaluating the potential of the technology. Other factors include the uniqueness of the technology, as well as

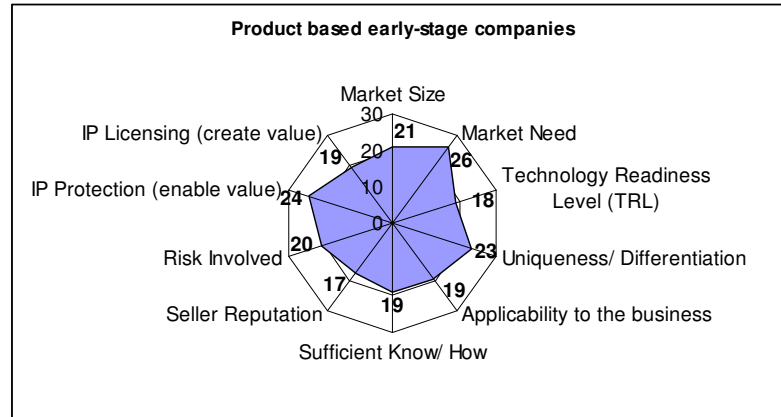
the importance of IP for the purpose of protection. However, as we mentioned earlier, these values are dependant on the company strategy and the type of product or service the company is offering.

Figure 13 shows the results for early-stage companies whose technology is used for services. The importance of IP has been reduced, and know how of the company is considered valuable.



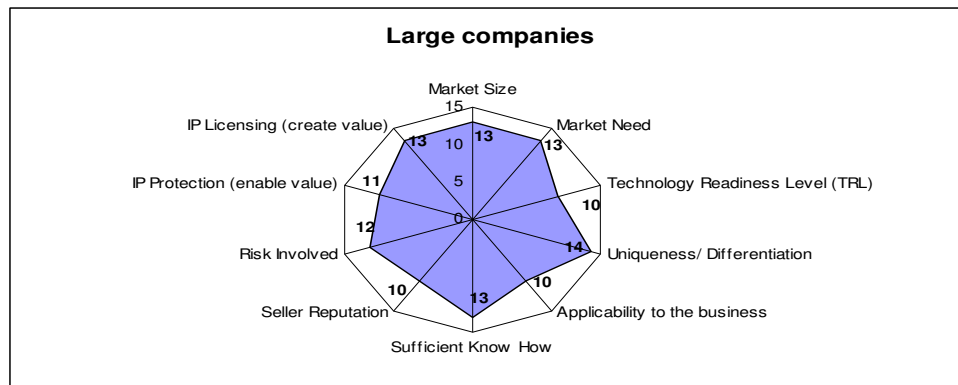
**Figure 13 - Service based early-stage company criteria for technology evaluation**

Figure 14 shows the results for technology evaluation from the perspective of early-stage companies that use technology to create products. The most important factors are market need, uniqueness of the technology and IP for the purpose of protection. IP would be considered of high importance to enable the company to exploit the technology without the threat of competition.



**Figure 14 - Product based early-stage company technology evaluation**

#### ❖ Large companies

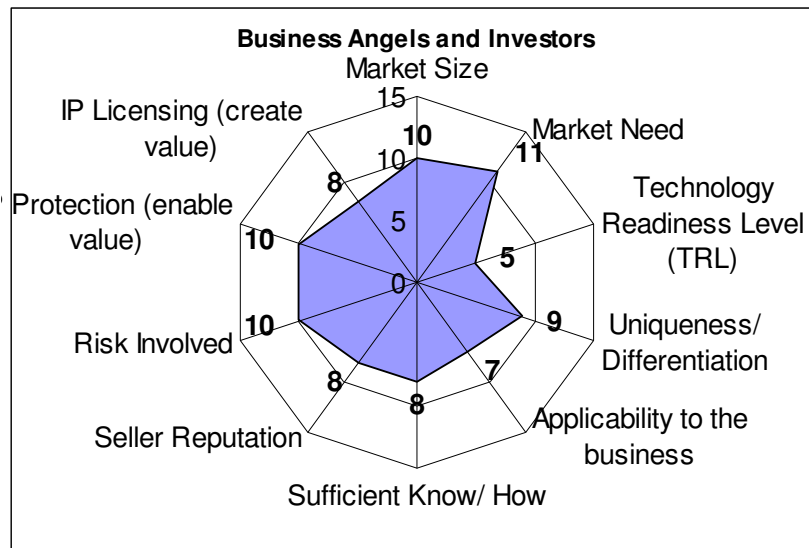


**Figure 15 - Results for large company criteria for technology evaluation**

Large companies place importance on the uniqueness and differentiation of the technology, they are more concerned with what the technology itself can provide the company. Other factors include the market need, sufficient know how in the team, and IP for the purpose of licensing. The value of IP as a protection seems less important, this could be due to large companies increasing emphasis on external R&D and their interest in the development of an IP strategy. The interesting point to note is the fact that large companies place a lot of importance on the market size available. They require a sufficient market size to justify investment in a new technology.

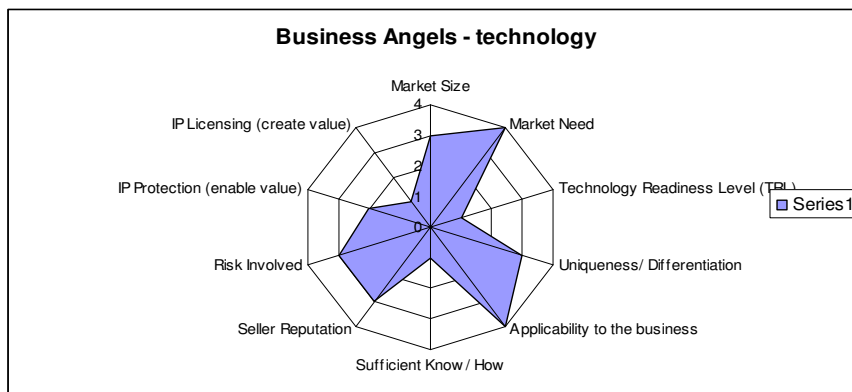
❖ *Business Angels and Investors*

Figure 16 shows that business angels and investors consider market factors to be the most critical when considering investing in a new technology. The technology must meet a particular need to be considered of any value. Other factors highlighted are the risk involved and the IP for the purpose of protection.



**Figure 16 - Results for business angels and investors criteria for technology evaluation**

However, as mentioned earlier the importance of IP is dependant on the technology, its lifecycle, and the purpose of the IP. Another point to take into consideration is the fact that business angels consider the technology readiness level to be the least important by a large margin.

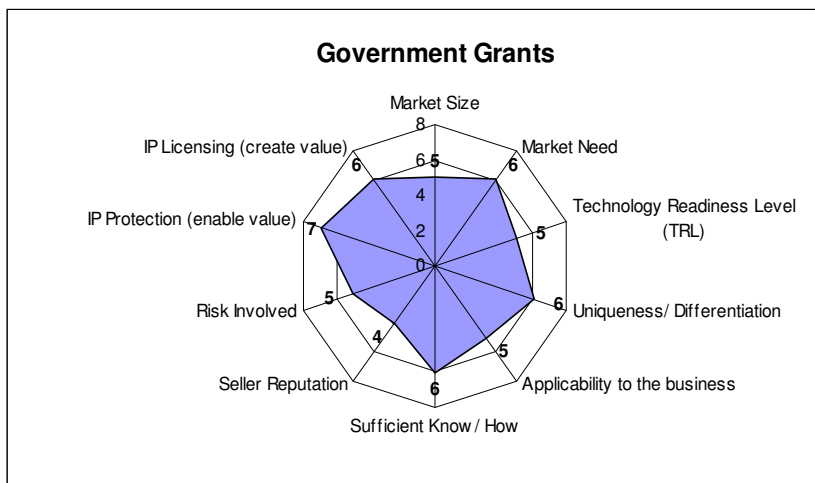


**Figure 17 - Results for business angel investing in technology**

Figure 17 shows the results from a particular business angel who believed that IP held little value aside for defensive purposes. IP is only considered important to

provide evidence showing the company's freedom to operate.

❖ *Government Grants*



**Figure 18 - Results for government grants criteria for evaluating technology**

The results from the questionnaire completed by members from government grants such as the Department of Trade & Industry are shown in Figure 18. It can be seen that IP for the purpose of protection and the market is considered the most important factors.

**6.3 Discussion of results**

The results from the questionnaire provide interesting revelations on the differences in the perception of the buyers and sellers. The main factors that are considered of value were the market and the technology itself in terms of its uniqueness and novelty. The value of IP is considered important, yet is not the main source of value to the technology.

However, it should be realised that due to time constraints, the results have not been gathered from a sufficiently large number of people. The data gathered is based on the opinion of a few people, and more research should be performed to ensure validity.

The approaches used to value brand and knowledge mentioned earlier (see Section 3), to attempt to bridge the gap between the intangible perceptions and the tangible revenues generated from it could be applied here. The characteristics of the technology could be evaluated using a set of criteria. This could possibly be correlated to an appropriate discount rate that would reflect the risk involved in the investment, and be applied to the DCF method of valuation. Further research in this area would investigate this concept further.

## 7 Case Study

### 7.1 Objective

The interviews and survey analysis have provided information on the methods of valuation used in practice for early-stage companies:

- Discounted Cash Flow – used mainly as a communication tool
- Valuation based on the investment required
- Technical assessment / Evaluation of the technology

This section aims to perform these valuations on an early-stage company, ErgoForm based on a MET1 Project. The purpose of performing this is to provide an example of the application of these valuation methods and to enable comparison of the results obtained.

### 7.2 Case Study 1: Discounted Cash Flow

This method of valuation was identified as being the most common approach used by early-stage companies, large companies and business angels. However, this method was stated to be used mainly for the purpose of communication as it is widely recognised.

A discount rate of 40% was applied to the projected cash flows of the company (see Appendix F). The discount rate was chosen using the values stated in Table 2 for the risks involved in entering a new market with a new technology.

NPV Calculation for 3 years = £966,966

### 7.3 Case Study 2: Valuation based on the investment required

The investment required to reach the next milestone, to increase the value of the company = £100,000.

Rule of Thumb used by business angels:

30-40% value of the company = Investment needed by the early-stage company

$$\begin{aligned}\text{ErgoForm company value} &= (100,000/30) \times 100 \\ &= £330,000\end{aligned}$$

### 7.4 Case Study 3: Technical assessment of the technology

Large companies prefer to consider the valuation based purely on technical assessment rather than financial. Results from the interview highlighted factors that were considered, and the company was assessed using this criteria using a range of 1-10:

✓ the technology = 7



- ✓ the market potential = 8
- ✓ Team management = 7
- ✓ uniqueness of the technology = 6
- ✓ Technology Life Cycle / Technology Readiness Level = 8
- ✓ Revenue – business plan = 7
- ✓ Protection = 4
- ✓ Technical feasibility = 6

Total = 66.25% average.

Large companies prefer companies that can provide a good combination of all factors required. A range of values should be made available through research and analysis of companies/ technologies that have been successful, to provide an indication for acceptance.

This method is subjective and the values provided in this case study are based on personal opinion.

## **7.5 Discussion of results**

The methods of valuation give very different results. The highest valuation seems to be through the use of DCF. However, this method is based on the cash flow projections stated by the company under consideration, and sellers will try to obtain the maximum value possible. The rule of thumb used by business angels gives a value that is significantly lower. Business angels will try to get the minimum value for a large share of the company.

The method used to evaluate the technology is based on comparison with other successful projects. The value obtained shows that the company would not be considered valuable and would have a low valuation. However, this method is based on the opinion of the assessor and is dependant on the buyer's strategy.

The evaluation method would be useful as it considers the importance of the technology itself together with its profitability. The technology of the company may be valuable in the long-term, as the company would have knowledge and expertise in a specialised area.

## 8 Conclusion

Company valuation methods of early-stage technologies used in practice varies for buyers and sellers. Methods used that have been identified through interviews are:

- Discounted Cash Flow method with probabilistic risks involved. Used mainly as a communication tool to justify investment.
- Rule of Thumb used by investors: 30-40% of the company is valued at the amount needed for the next investment stage
- Technical assessment based on a set of criteria

These valuation methods deliver different results. The value of the company is always considered to be what the buyer is willing to pay.

Technology is often evaluated using the following criteria:

- Market
- Team management
- Protection/ Defensibility
- Product status: prototype or launched
- Fit – resources and capabilities they personally had to offer
- Revenue – business plan

There is a range of opinions considering the importance of IP in the valuation of the company. The value of the IP is highly dependant on the type of technology and its lifecycle. Many believe that IP is used mainly for defensive purposes and to prove the company's ability to operate freely without the threat of infringement. IP is also considered of little value to early-stage companies who might not have the necessary funds to defend their patent.

The value of IP is equated with technology during its early-stages. However, as the company progresses the value of the technology increases through the use of an appropriate business model and through the gain in know-how and experience of the company members.

The results from interviews and surveys have highlighted the importance of the intangible assets of a company. Many companies base their valuation of a technology on its characteristics using a set of criteria. Further research needs to be done to attempt to bridge the gap between the intangible perceptions and the tangible revenues of technology, to provide a more accurate view of its value in the long-term.

## **9 APPENDICES**

- A) Long Project Brief**
- B) Questionnaire**
- C) Company Contacts Interviewed**
- D) Interview Notes**
- E) Database of Questionnaire Results**
- F) Case Study 1: DCF Analysis**
- G) References**

## **A) Long Project Brief**

**MET 2 LONG PROJECT BRIEF 2006**  
NURLIN MOHD SALLEH

PROJECT TITLE	Early Stage Company Valuation
PROJECT DEFINITIONS	<p>Intellectual Property (IP) - a term often used to refer generically to property rights created through intellectual and/or discovery efforts of a creator that are generally protectable under patent, trademark, copyright, trade secret, trade dress or other law.</p> <p><a href="http://www.techtransfer.umich.edu/index/glossary.html">www.techtransfer.umich.edu/index/glossary.html</a></p>
PROJECT BACKGROUND	<p>Company valuation plays an important role in the field of corporate finance. It is important for mergers and acquisitions, and the process involved in valuation helps to identify areas of economic value in the company.</p> <p>The most common and accepted method of company valuation is to perform a financial valuation of the company's tangible assets. This gives a general and basic view of the company. The project will investigate how this is usually performed and if this provides sufficient information of the value of the company?</p> <p>Company valuation could consist of at least three other possible streams, including knowledge, technology and brand. The work will involve investigating existing methods of valuation for each area and identifying its advantages and disadvantages. Which area gives a more appropriate view of the company and is considered to be of higher value? As a company matures, does its emphasis on an area of valuation change?</p> <p>This project is intended to identify the different methods of valuing early-stage technology businesses from different perspectives. The focus is on start-ups based on early-stage technology, as there is greater difficulty in valuing their company. A company's value is different for different buyers and it may also be different for buyers and sellers. The buyer's aim is to determine the maximum price they are prepared to pay for the company being bought, with the insight to the potential contribution to the business' future value. The seller's aim is to ascertain the minimum price that it should accept for its company. Comparisons of each need to be considered to obtain an accurate value for the company.</p> <p>Intellectual property (IP) assets can be sold, licensed, used as collateral or security for debt finance, or they can provide an additional basis for seeking equity from friends, family, private investors, venture capitalists, and from banks. In addition, the Government provides support to high-tech start-ups through grants, guarantees, subsidies and</p>

soft loan schemes, which are provided via various public funding institutions and banks that directly or indirectly recognise the importance of intellectual property assets. Different investors may value IP assets in different ways and may attach different degrees of importance to IP rights. There is an increasing reliance on IP assets as a source of competitive advantage for companies.

Intellectual property (IP) assets may help to strengthen the case for obtaining business finance from investors. The investor will assess whether the new or innovative product or service offered by the SME is protected by a patent, a utility model, a trademark, an industrial design, or copyright or related rights. Such protection is often a good indicator of the potential of the company for doing well in the marketplace. The project looks at the validity of the previous statement, and how much importance is attributed to the value of IP assets a company holds.

The project looks specifically at comparisons between the value of IP and technology valuation. What can the differences between them be attributed to? Does the value of IP give a robust view of the outcome of the company in the future? The project involves identifying what determines the future growth of the company, and if IP, specifically technological, plays a significant factor to this.

Of the three possible streams, technology, brand and knowledge valuation, which contributes the most to the worth of the company in the long-term?

If the value is the opinion of the price IP or technology will afford in the market place, worth is an integration of the rewards of creation and exploitation of the IP or technology to the company.

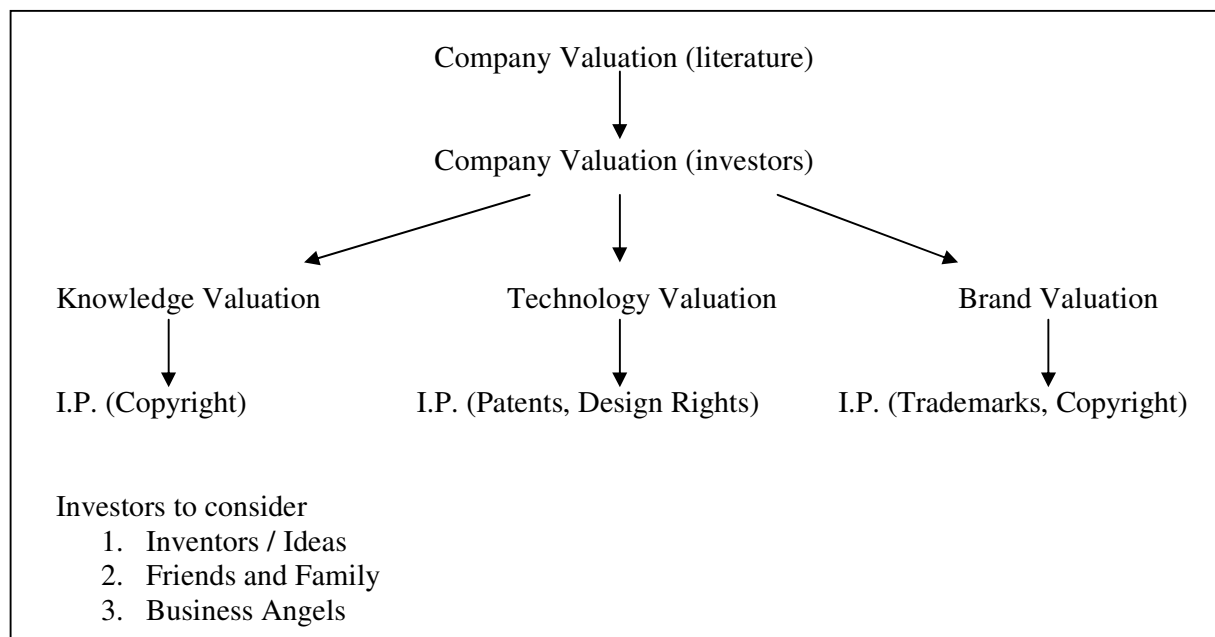
PROJECT AIM	Focuses on the assessment of the different ways of estimating company value, when the company concerned is based on an early-stage technology.
PROJECT OBJECTIVES	<ul style="list-style-type: none"> <li>• To identify different methods to value companies, looking specifically at knowledge, technology and brand valuation</li> <li>• To identify ways to value IP assets looking from different perspectives – buyers, sellers, investors</li> <li>• To compare technology valuation to IP valuation</li> <li>• To investigate contribution of technology IP assets to the overall worth of the company in the long – term.</li> </ul>
PLAN OF ATTACK	<ol style="list-style-type: none"> <li>1. Investigate methods of company valuation - general, financial. (<i>Internet, Judge Institute Library, BATP tools used, Paul Guest</i>)</li> <li>2. Investigate methods of technology, brand and knowledge valuation. Assess existing process strengths and weaknesses. (<i>Internet, Judge Institute, Simon Pattinson, James Moultrie, design consultancies</i>)</li> </ol>

3. Source early-stage technology companies and investors (inventors, business angels, venture capitalists). Analyse different valuation methods used from different perspectives. (*MET Industrial Links, BATP, CUE Cambridge Enterprise, St John's Innovation Centre, Tim Minshall*)
4. Consider different methods of valuation and whether general guidelines can be produced.
5. Obtain information on IP of the company, justification behind it, possible future usage and worth to the company. (*Source investors from early-stage companies and perform interviews*)
6. Perform valuations for technology and IP assets.
7. Compare technology valuation to the value of the IP assets. Is this an accurate view?
8. Consider value of IP assets to the future growth of the company. Does it provide a robust view of the future outcome?

**PROJECT  
DELIVERABLES**

1. Report on the motivation for funding early-stage companies
2. Recommendations to perform early stage technology valuations
3. Examples of possible applications of valuation principals
4. Report on the importance of IP assets, and technology valuation to the overall future worth of the company.

**Suggested Initial Map of Valuation Streams**



Date: 29/3/2006

Version No: 3

Gantt Chart for MET2 Long Project 2006						
	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
	1/5 - 7/5	8/5 - 14/5	15/5 - 21/5	22/5 - 28/5	29/5 - 4/6	5/6 - 9/6
1. Investigate methods of company valuation - general, financial, tools used						
2. Investigate methods of technology, brand and knowledge valuation						
3. Review project						
4. Source early-stage technology companies and investors.						
5. Analyse different valuation methods used from different perspectives						
6. Obtain info on IP of the company, justification, possible future usage and worth						
7. Perform valuations for technology and IP assets						
8. Review project						
9. Compare technology valuation to the value of the IP assets.						
10. Consider value of IP assets to the future growth of the company						

#### Project Dates:

- Project Review Week 2 – 12/5 Friday 2pm
- Project Review Week 4 – 25/5 Thursday 2pm
- Project Presentation – 9/6 Friday Meeting Room 2, 2-3.30pm



## **B) Questionnaire**

## **MET2 Long Project Interview Questions (early-stage companies)**

### **1. Introduction**

- a) Company Name:
- b) Contact Name:
- c) Position in Company:
- d) Company Operation (what is the company good at? / core competence?):

### **2. Business Funding**

- a) What were your sources for funding the business? (family, friends, business angels)
- b) How did you obtain the funding required? Was there a business plan?
- c) What were the main concerns brought up? What criteria did they have to make a decision on the potential of the company? (market size, market need, risks involved etc.)
- d) Was there a specific valuation method/ tool used or was their judgement based on judgement/ gut- instinct?

### **3. A) Quantitative: Valuation methods, tools, techniques and issues**

#### **B) Qualitative: Roadmapping, mind-mapping,**

- a) Do you use any specific valuation methods, tools and techniques? (NPV, Options, Monte Carlo, historical data....)
- b) Why did you choose to use that method of valuation (motivation)?
- c) What are the good/bad aspects of your current approach?
- d) What criteria do you use to make a decision on the potential of the technology? (I.P. - protection, licensing, market size, market need, technology differentiation etc.)
- e) Do you have any past examples we could find out more about?
- f) Do you use IP or technology valuation or do you consider them to be the same thing?
- g) Do you also attempt to value the brand and the knowledge in the company, and how would you do this?

### **4. I.P. Valuation**

- a) Do you consider I.P. important to the business?
- b) Is I.P. used for protection or commercial purposes? (technology/ brand/ knowledge)

c) Do you use any specific valuation methods? What are the good/ bad aspects of your current approach?

**5. Any other valuation issues you would like to mention? (5 mins)**

- a) Things we have missed?
- b) What you see as most important?
- c) Other than purely financial aspects, what do you see as the most important considerations in technological decision making?

<b>Ranking/ Rating for technology evaluation</b>				
<b>Technology Criteria</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
Market Size				
Market Need				
Technology Readiness Level (TRL)				
Uniqueness/ Differentiation				
Applicability to the business				
Sufficient Know / how				
Seller reputation				
Risk involved				
I.P. – protection (enable value)				
I.P. – licensing (create value)				

## **MET2 Long Project Interview Questions (large companies)**

### **1. Introduction**

- a) Company Name:
- b) Contact Name:
- c) Position in Company:
- d) Company Operation (what is the company good at? / core competence?):

### **2. Business/Technology Context (15 minutes)**

- a) What typical business/technology decisions are you involved in? -what is the time frame of decisions?
- b) How much of the current revenue is generated from new technologies?
- c) What is the size of your current technology development project portfolio (in number of projects, investment, FTEs)?

### **3.A) Quantitative: Valuation methods, tools, techniques and issues**

#### **B) Qualitative: Roadmapping, mind-mapping,**

- a) Was there a specific valuation method/ tool used or was your judgement based on judgement/ gut- instinct?
- b) Do you use any specific valuation methods, tools and techniques? (NPV, Options, Monte Carlo, historical data....)
- h) Why did you choose to use that method of valuation (motivation)?
- d) What are the good/bad aspects of your current approach?
- e) What future requirements do you have wrt assessing/valuing technology?
- f) What criteria do you use to make a decision on the potential of the technology? (I.P. - protection, licensing, market size, market need, technology differentiation etc.)
- g) Do you have any past examples we could find out more about?
- h) Do you use IP or technology valuation or do you consider them to be the same thing?
- i) Do you also attempt to value the brand and the knowledge in the company, and how would you do this?

### **4. I.P. Valuation**

- a) Do you consider technology I.P. important to the business?
- b) Is I.P. used for protection or commercial purposes?

c) Do you use any specific valuation methods? What are the good/ bad aspects of your current approach?

**5. Any other valuation issues you would like to mention? (5 mins)**

d) Things we have missed?

e) What you see as most important?

f) Other than purely financial aspects, what do you see as the most important considerations in technological decision making?

Please rank the following (1=low, 4= high)

<b>Ranking/ Rating for technology evaluation</b>				
<b>Technology Criteria</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
Market Size				
Market Need				
Technology Readiness Level (TRL)				
Uniqueness/ Differentiation				
Applicability to the business				
Sufficient Know / how				
Seller reputation				
Risk involved				
I.P. – protection (enable value)				
I.P. – licensing (create value)				

Any other comments?

## **MET2 Long Project Interview Questions (business angels)**

### **1.Introduction**

e) Contact Name:

### **2.Business Funding**

- a) How many companies have you funded in the past?
- b) What types of companies do you usually assist?
- c) Why do you choose to fund start-up companies?
- d) How do companies usually sell their ideas? What valuation methods do they use?
- e) What are the good/bad aspects of their approach?
- f) Do you have a specific example?

### **3.A) Quantitative: Valuation methods, tools, techniques and issues**

#### **B) Qualitative: Roadmapping, mind-mapping,**

- a) Is your decision to provide funding based on judgement/ gut-instinct or through a certain valuation/evaluation process?
- b) Do you use any specific valuation methods, tools and techniques? (NPV, Options, Monte Carlo, historical data....)
- c) Why did you choose to use that method of valuation (motivation)?
- d) What are the good/bad aspects of your current approach?
- e) What future requirements do you have wrt assessing/valuing technology?
- f) What criteria do you use to make a decision on the potential of the technology? (I.P. - protection, licensing, market size, market need, technology differentiation etc.)
- g) Do you have any past examples we could find out more about?
- h) Do you use IP or technology valuation or do you consider them to be the same thing?
- i) Do you also attempt to value the brand and the knowledge in the company, and how would you do this?

### **4. I.P. Valuation**

- a) Do you consider I.P. important to the business?

- b) Is I.P. used for protection or commercial purposes (technology/ brand/ knowledge)?
- c) Do the companies use any specific valuation methods to value I.P.? What are the good/ bad aspects of their approach?

**5. Any other valuation issues you would like to mention? (5 mins)**

- g) Things we have missed?
- h) What you see as most important?
- i) Other than purely financial aspects, what do you see as the most important considerations in technological decision making?

<b>Ranking/ Rating for technology evaluation</b>				
<b>Technology Criteria</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
Market Size				
Market Need				
Technology Readiness Level (TRL)				
Uniqueness/ Differentiation				
Applicability to the business				
Sufficient Know / how				
Seller reputation				
Risk involved				
I.P. – protection (enable value)				
I.P. – licensing (create value)				

## **C) Company Contacts Interviewed**



<b>Contacts Database</b>				
<b>Early-stage companies</b>	<b>Contact Name</b>	<b>Position</b>	<b>Email</b>	<b>Interview Date</b>
Green Machine	Nicos Raftis			12/5/2006
Object Security	Ulrich Lang		<a href="mailto:ulrich.lang@objectsecurity.com">ulrich.lang@objectsecurity.com</a>	29/5/2006
Camfpd	Quintus Travis		<a href="mailto:quintus.travis@camfpd.com">quintus.travis@camfpd.com</a>	25/5/2006
Q-Flo	Martin Pick		<a href="mailto:martin.pick@gmail.com">martin.pick@gmail.com</a>	31/5/2006
<b>Large Companies</b>				
Nokia	Dr Mika Karilahti	Director New Technology Sourcing	<a href="mailto:mika.karilahti@nokia.com">mika.karilahti@nokia.com</a>	16/5/2006
Kodak	Ruth Thomson	Innovations Coordinator	<a href="mailto:ruth.thomson@kodak.com">ruth.thomson@kodak.com</a>	23/5/2006
Rolls Royce	Dr Henri Winand	Vice President Corporate Venturing	<a href="mailto:Henri.Winand@Rolls-Royce.com">Henri.Winand@Rolls-Royce.com</a>	31/5/2006
<b>Business Angels &amp; Investors</b>				
	Jack Lang		<a href="mailto:Jack@lang.net">Jack@lang.net</a>	30/5/2006
Beer & Partners Ltd.	Lawrence Fenelon	Associate	<a href="mailto:fenelon@beerandpartners.com">fenelon@beerandpartners.com</a>	30/5/2006
ET Capital	Martin Rigby	VC Investor	<a href="mailto:martin@etcapital.com">martin@etcapital.com</a>	1/6/2006

## **D) Interview Notes**

### **A) Early-stage companies**

#### **INTERVIEW 1**

**Company Name:** Green Machine

**Contact Name:** Nicos Raftis

**Company Operation:**

- The company was involved in technology to produce energy
- Differentiated technology integrating to produce a complete system
- Through the use of licensing from a patented technology

**Company funding:**

- Business shareholders – private equity
- Did not require detailed business plan to obtain funding – rather through relationships between the team

**Decision made on judgement and gut/instinct:**

- Yes – what value the technology is to you – what resources do you have to exploit the technology and to gain value in the future?

**Decision Criteria:**

- Dependant on how well the technology is described
  - ✓ Commercial potential
  - ✓ Protection
  - ✓ Potential – links, expertise – ability to perform and convey confidence
- Decision is made after gathering data, calculating costs and further analysis

**Valuation methods:**

- DCF – people recognise, use as a communication tool, you cook your numbers to justify your feelings
  - ✓  $r = 15-30\%$ ; it is an arbitrary number – perception of your own ability to exploit the technology with risks involved. In this situation, the relationship with the professor was the risk as he is the person of access to further development.
- Rule of thumb: VC will identify what IP will do for the company that is buying. 50% Revenue obtained – apply DCF with  $r > 30\%$ .

**Importance of IP:**

- Dependant on the nature of the technology
  - ✓ too fast is not important
  - ✓ this case 10-20 years

## **INTERVIEW 2**

**Company Name:** Object Security

**Contact Name:** Ulrich Lang

**Company Operation:**

- IT Security Company
- Global company
- R&D based – licensing + products (subscriptions)

**Company funding:**

- Started with contract – grant
- Private equity – PhD funding

**Decision made on judgement and gut/instinct:**

- Gut-instinct
- “pushed” into the industry by the technology from government, large companies

**Decision Criteria:**

- niche market – no one else could do it
- motivation – lifestyle and long-term financial reward

**Valuation methods:**

- No valuation – was not asked for it.
- Relied on recommendations from larger companies
- not really considered – maybe the balance sheet
- No sense looking at cost – the value should be based on what the customer is willing to pay
- Value in know how, clients, technology – individuals are of importance, not the company
- Value in the potential of the technology
- He was affiliated with business before – had the necessary credentials

**Importance of IP:**

- IP is not important – you are dead before you go to court

**Comparison between technology and IP:**

### **INTERVIEW 3**

**Company Name:** CamFPD

**Contact Name:** Quintus Travis

**Company Operation:**

- Generation of optical related IP for 2D and 3D flat panels
- Mission is to develop and license technology

**Company funding:**

- DTI (Dept. of Trade and Industry) SMART award £45,000 against stiff competition
- Award required founders to match the funding with private equity - £20,000 each
- Potential licensees of technology £350,000
- NESTA - £150,000

**Decision made on judgement and gut/instinct:**

- Not asked

**Decision Criteria:**

- N/A

**Valuation methods:**

- DCF are a joke for small companies
- Look at the amount of money you require, figure out how much equity you've got, and allocate to different rounds of investment (need to save money for later rounds)
- Start-off using DCF on the basis of flaky numbers
- To approach corporate companies
  - ✓ look at strategic fit and value to the company, there are different decision processes and committees at different levels
  - ✓ tweak the valuation to fall in the right group to obtain the best valuation
- Exit strategy is important!

**Importance of IP:**

- IP is fundamental
- Early-stage companies don't have debt or equity/ assets, therefore need to invest in their IP
- IP is not worth anything if there is no commercialisation possibilities – e.g. LCDs is a crowded marketplace, you need other people's patents in order to sell products
- IP needs to be protected and applied

**Comparison between technology and IP:**

- IP = Technology Valuation
- Keep things simple (black and white)

#### **INTERVIEW 4**

**Company Name:** Q-Flo

**Contact Name:** Martin Pick

#### **Company Operation:**

- Technology based on carbon nano-tubes – long, stiff tubes made from carbon atoms
- Can be used for a wide range of uses – strengthening composites, making fibre
- Exploiting core IP – has a 3 minimum year program to prove it can work
- Is based on a disruptive technology

#### **Company funding:**

- Private equity – team salaries
- Next step requires £5-8 million, currently in the process of trying to find funding.
- Technology has the potential of £8 billion turnover
- Need to find the right investors. Is currently outside the scope of business angels – need large investment.

#### **Decision made on judgement and gut/instinct:**

- Yes

#### **Decision Criteria:**

- Ambition – desire to make money, though this is the least factor
- Technically interesting
- Able to be at the birth of a new industry
- Age factor – has less commitment and pressure at a later age

#### **Valuation methods:**

- Valuation – based on the cost to develop the process when considering its worth in 3 years time, if it can be proven to work - £50 million. Estimate it is worth  $1/10^{\text{th}}$  of that value now.
- Looked at the value of the market and what it can achieve in 10 years time
- Belief investors want 10:1 investment within 3 years time – quick money

#### **Importance of IP:**

- IP is critical
- Level of know how is important
- IP is used to get investment from VCs, sponsor companies, multinationals – IP is important, if not they'll just be given jobs within the company
- The risk is you never know if the IP will hold
- It is difficult to defend the patent unless you have a big strong partner
- The University acts as a deterrent to infringement as they will defend the patent and it gives large companies a bad reputation if they choose to infringe
- IP is used for protection purposes – need for commercial purposes

#### **Comparison between technology and IP:**

- Technology = IP at this stage of the development
- Now: 90% patent, 10% know how
- 3 years time: 50% patent, 50% know how – in-house capability, has experience and is ahead of the game

## **INTERVIEW 5**

**Company Name:** Smart Holograms

**Contact Name:** Frank Craig

**Company Operation:**

- To exploit an exciting new technology that enables the development of a new generation of sensors for use in the Medical Devices and Diagnostics sector.
- The technology comprises novel interactive holograms ("sensor holograms") that can be engineered to change wavelength, image, brightness or position in response to a wide range of biological, chemical and physical stimuli.

**Company funding:**

N/A

**Decision made on judgement and gut/instinct:**

N/A

**Decision Criteria:**

- Intellectual Property.
- Proof-of-concept
- Management team.
- Market sizes.
- Product enablement
- Commercial partnerships.
- Product status: prototype or launched

**Valuation methods:**

- the valuation that we set is irrelevant, its what the market will pay so they set it

**Importance of IP:**

- IP is very important

**Comparison between technology and IP:**

## **B) Large Companies**

### **INTERVIEW 1**

**Company Name:** Nokia

**Contact Name:** Dr Mika Karilahti

**Position in the company:** Director New Technology Sourcing (NTS)

#### **Company operation:**

- Success at operating system
- Moving from handsets to consumer electronics
- Focused on incremental innovation and some disruptive technology, though the departments are kept separate for risk avoidance
- Currently facing problems making the transition as they have no patents in multimedia, and are investing heavily in R&D internally and externally
- Outsourcing increasing as R&D spend reducing from 12.8% to 8%
- IPR developing IP strategy by outsourcing and looking at competitors

#### **Decision made on judgement and gut/instinct:**

- Overall procedure is based on collective gut-feel

#### **Decision Criteria:**

- Sourcing technology based on product found in the market need
- Perform an industry technology roadmap – looking at technology development and extrapolating from it
- Technology needs a Project Champion – someone to take it on throughout the project
- Database – ‘Focal Point’ – is a way of gathering information on new technologies, companies, descriptions

#### **Valuation methods:**

- Is based purely on technical assessment rather than financial
- 1) Overview (higher level) of technology using criteria: technology, economic, political (legislation)
  - ✓ trying to introduce TRL
  - ✓ trying to improve the management of their technologies by moving towards a stable and standard process to evaluate technology
- 2) Analyse the technology:
  - ✓ Technology portfolio management – probability of success of technology without Nokia, potential impact on the technology field
  - ✓ Required Management Tool – custom oriented – e.g. market research, user required document

#### **Importance of IP:**

- IP is becoming of increasing importance because of the focus to external R&D

#### **Comparison between technology and IP:**

Not asked



## INTERVIEW 2

**Company Name:** Kodak

**Contact Name:** Ruth Thomson

**Position in the company:** Innovations Coordinator

**Company operation:**

- Medical, printing photo display technology
- Company moving towards a more external focus – looking at new technologies for licensing and collaborations
- Set up process of filtering ideas

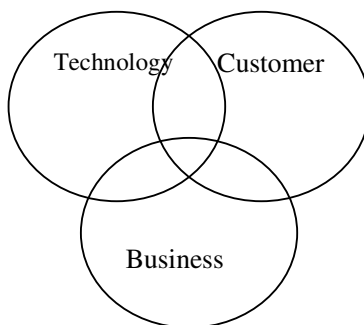
**Decision made on judgement and gut/instinct:**

- Decision at the early-stage is based on people's judgement

**Decision Criteria:**

- Use of technology roadmap at very high level
- Capture everything on an IDEAS board – cards with information, champion gathers information about them
- Initial pass – fit
  - ✓ Incremental – to pass over to business unit
  - ✓ Disruptive – found from roadmap
  - ✓ Blue Sky – not on a roadmap but people feel that it makes strategic sense
  - ✓ Ask a series of questions concerning: Unique, TLC S curve, Value, Revenue-business plan, Protection – IP, Champion?
  - ✓ Blue Sky questions asked: Why Kodak, Protection, Is it really amazing, Technically feasible, Champion?

Capture → Categorise → Filter → Review → Decision → Progress to desired location



The technology is assessed by how a scoring system to see if it meets the criteria of technology, customer and the business. The criteria is scored out of 10 and this is calculated for a % using a matrix chart. A good project will overlap all 3 areas. However, this method is too complicated and it can be easily fixed to get the results wanted.

**Valuation methods:**

- N/A
- Early stage – more emphasis on people

**Importance of IP:**

- IP is very important
- Licensing – to obtain revenue
- Is it defensible?
- Get good relationships before others do

### **INTERVIEW 3**

**Company Name:** Rolls Royce

**Contact Name:** Dr Henri Winand

**Position in the company:** Vice President Corporate Venturing Rolls Royce plc.

**Company operation:**

- Not asked

**Decision made on judgement and gut/instinct:**

- Yes

**Decision Criteria:**

- In valuing a technology:
  - ✓ Market – size of the potential market?
  - ✓ Business
  - ✓ People – quality of the management team?
- Need people in a business that deliver great things for the technology

**Valuation methods:**

- very subjective
  - ✓ business has cash flow – DCF and probabilistic risk on business
  - ✓ new company – based on likely scenarios – markets (size, need, niche), is it >£50 million in 5-7 years time?
  - ✓ Well established companies – DCF or tangible asset + goodwill calculations

**Importance of IP:**

- It is best to have IP owned by the business on clear terms
- However, IP is not important – e.g. Dell's business plan is unique even if there is no IP
- IP is important in the broader sense of innovation

**Comparison between technology and IP:**

- IP does not equal to technology – e.g. business model is important for the success of the technology

### **C) Business Angels and Investors**

#### **INTERVIEW 1**

**Contact Name:** Jack Lang

**Motivation for funding:**

- Challenge involved
- Would rather make a penny to a pound rather than a pound to 100 pounds

**Decision made on judgement and gut/instinct:**

- Yes based on gut instinct, but use calculations to justify it

**Decision Criteria:**

- Market is the most important factor – if you don't know where it can be used then its worthless
  - ✓ Market Need – who needs it?
  - ✓ Is it sustainable?
  - ✓ Global
  - ✓ Total available market – actual, real
- Team – secondary because you can buy the team you need
- Defensible Technology – IP, brand, market share, know how
  - ✓ Does it conform to international standards?
  - ✓ Does the technology have a reasonable chance of working?
- Believable Plan – marketing, business, sales etc
- Financials – 60% IRR

**Valuation methods:**

- 30%-40% of the company for the amount needed for the next investment stage
- therefore, the valuation is twice the amount you are trying to raise
- traditional methods such as asset based, NPV of future profit and DCF is not worth using, as profitability is not believable beyond a year

**Importance of IP:**

- Patents are defensive not offensive
- Patents are not considered important
- Freedom to operate – Only needed to show that you are not infringing on someone else's patent, and to show that you can build your product and no one is going to stop you
- Young companies having lots of patents is negative because they haven't done the real work

**Comparison between technology and IP:**

- Technology and IP have no value
- The idea is the cheapest part of the whole process - Example:
  - ✓ (1)- Cost to build the prototype
  - ✓ Costs 3 x (1) to turn the prototype into a product
  - ✓ Costs 10 x (1) to manufacture and sell it
- Making it work and selling it costs the most money
- There are mainly risks in the market

## **INTERVIEW 2**

**Contact Name:** Lawrence Fenelon – biotechnology funding

**Motivation for funding:**

- Challenge involved
- Would rather make a penny to a pound rather than a pound to 100 pounds

**Decision made on judgement and gut/instinct:**

- Not asked

**Decision Criteria:**

- For early-stage technology (biotech):
  - ✓ Patent protection – is less important for software – it needs to show there is market advantage
  - ✓ 1 year running
  - ✓ reasonable management
  - ✓ 3<sup>rd</sup> party endorsement – grant from DTI, University challenge fund, GEIF matching funding – to show people have looked the company and done due diligence
- Different for software/ technology because biotech has market but not sure tech will work, whereas tech can work but is there a market for it?
- Investing rule: back very bright people – look at their research portfolio

**Valuation methods:**

- Rules of thumb:
  - ✓ How much money needed to reach the next milestone + contingency, to increase the value of the company?
  - ✓ Founders are not willing to part with more than 50% share of the company
  - ✓ Therefore, how much can you get away with for 50% stake?
- For the above decision criteria, the value of the company would be considered to be £500k-600k pre-money.

**Importance of IP:**

- Patents are very important in the biotech industry – can be protected, and the technology has a long lifetime

**Comparison between technology and IP:**

- Technology and IP are different, as technology includes what the management chooses to do with the IP.
- The company exploits the technology around the IP that provides protection from competitors

## **SHORT INTERVIEWS**

### **Dr Michael Brand Captum Masterclass**

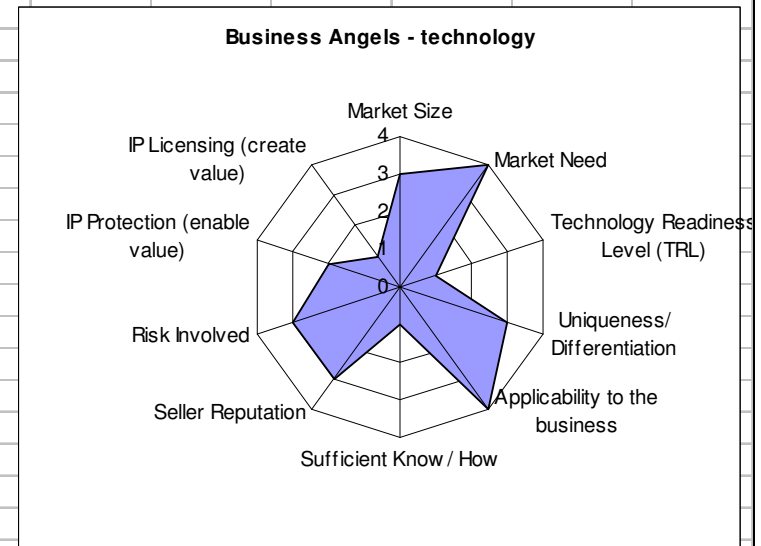
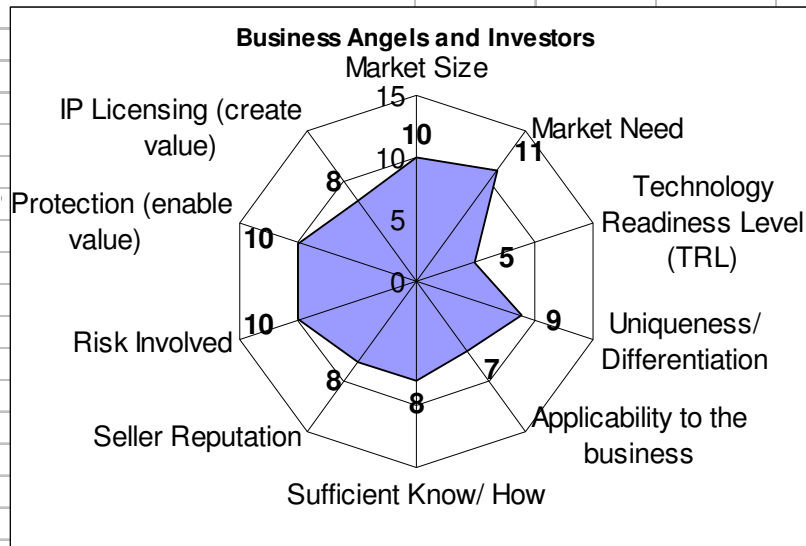
- IP is not important, it is dependant on:
  - ✓ The company's ability to defend the IP, which costs a lot of money and reduces the revenue stream
  - ✓ Technology can become obsolete before the patent has been accepted
  - ✓ Competitors can find another method to perform the technology
  - ✓ Awareness of the infringement occurring?

### **Dr Helen Avidex**

- VCs will not give a high valuation till there is proof of concept
- At the early stage: IP = Technology Valuation
- Europe VCs look at the people in the company – reputation

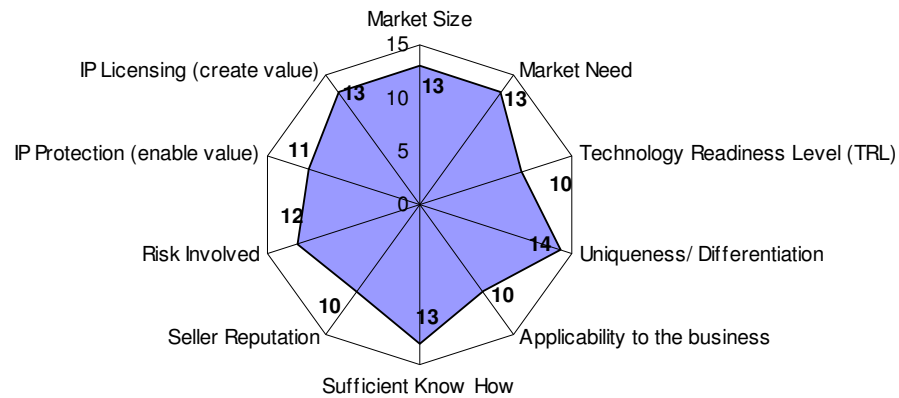
## **E) Database of questionnaire results**

Results for Ranking/ Rating of Technology Valuation						
Technology Criteria	Dr Geeta C	Martin Rigby - ET Cap	Jack Lang	Lawrence Fenelon		TOTAL
Market Size	4	Market Siz	3	3	Market Siz	10
Market Need	4	Market Ne	4	3	Market Ne	11
Technology Readiness Level (TRL)	2	Technology	1	2	Technology	5
Uniqueness/ Differentiation	3	Uniquenes	3	3	Uniquenes	9
Applicability to the business	2	Applicabili	4	1	Applicabili	7
Sufficient Know/ How	3	Sufficient k	1	4	Sufficient k	8
Seller Reputation	3	Seller Rep	3	2	Seller Rep	8
Risk Involved	4	Risk Involv	3	3	Risk Involv	10
IP Protection (enable value)	4	IP Protecti	2	4	IP Protecti	10
IP Licensing (create value)	4	IP Licensin	1	3	IP Licensin	8
TOTAL						86



Results for Ranking/ Rating of Technology Valuation						
Technology Criteria	Nokia	Kodak	Nick Hastings - TTP	Rolls Royce - Dr Henri Winand		TOTAL
Market Size	3	4	2	4	Market Siz	13
Market Need	3	3	3	4	Market Ne	13
Technology Readiness Level (TRL)	3	1	3	3	Technology	10
Uniqueness/ Differentiation	3	4	4	3	Uniquenes	14
Applicability to the business	3	4	2	1	Applicabilit	10
Sufficient Know How	3	3	3	4	Sufficient k	13
Seller Reputation	3	3	2	2	Seller Rep	10
Risk Involved	3	3	3	3	Risk Involv	12
IP Protection (enable value)	3	4	2	2	IP Protecti	11
IP Licensing (create value)	3	4	2	4	IP Licensir	13

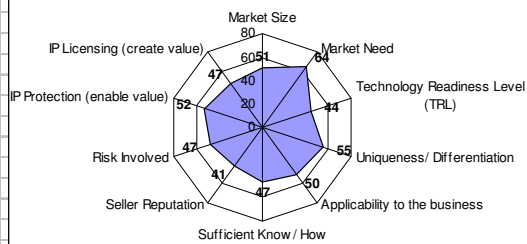
### Large companies



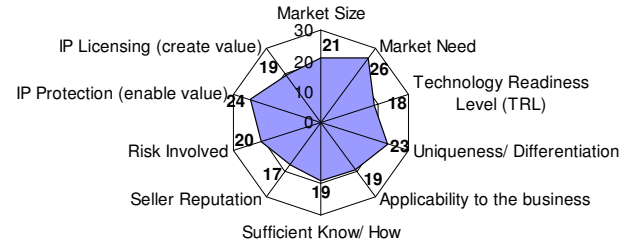


Results for Ranking/ Rating of Technology Valuation																					
Technology Criteria	Nicos Raftis	Thiery Lar	Ved - Thin	Hitec		Alloy Malloy - bit 10	Tim Joblin	Lapsafe (p	Rishard Pr	Paul Baus	Sorut Sun	Hendrik P	Tony - Xia	Nunima - I	Nuco Puer	Ulrich - Ob	Campfd - C	Q-Flo - Martin	Pick	TOTAL	
Market Size	3	3	3	3		3	2	4	2	1	3	4	3	4	4	1	4	4	4	Market Siz	51
Market Need	4	3	4	4		4	4	4	4	2	4	3	4	4	4	4	4	4	4	Market Ne	64
Technology Readiness Level (TRL)	3	2	3	3		3	3	2	3	3	3	1	3	2	3	3	2	2	2	Technology	44
Uniqueness/ Differentiation	4	3	2	3		3	3	3	4	1	3	4	4	3	3	4	4	4	4	Uniquenes	55
Applicability to the business	4	4	2	4		4	3	3	3	1	3	1	3	3	3	4	4	4	1	Applicabil	50
Sufficient Know/ How	4	3	2	3		2	2	3	4	3	2	3	3	2	3	4	1	3	3	Sufficient P	47
Seller Reputation	2	2	1	4		3	1	4	2	4	3	1	2	3	2	3	3	1	1	Seller Rep	41
Risk Involved	3	3	2	3		2	2	3	2	3	4	1	4	3	3	4	3	2	2	Risk Involv	47
IP Protection (enable value)	4	3	3	3		2	3	4	3	2	3	3	3	3	4	1	4	4	4	IP Protecti	52
IP Licensing (create value)	3	3	3	3		2	3	2	3	4	3	2	2	3	4	2	4	1	1	IP Licensir	47
TOTAL	34	29	25	33		28	26	32	30	24	31	23	31		33	30				498	

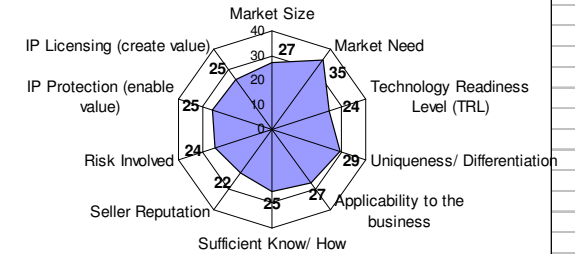
Early-stage companies



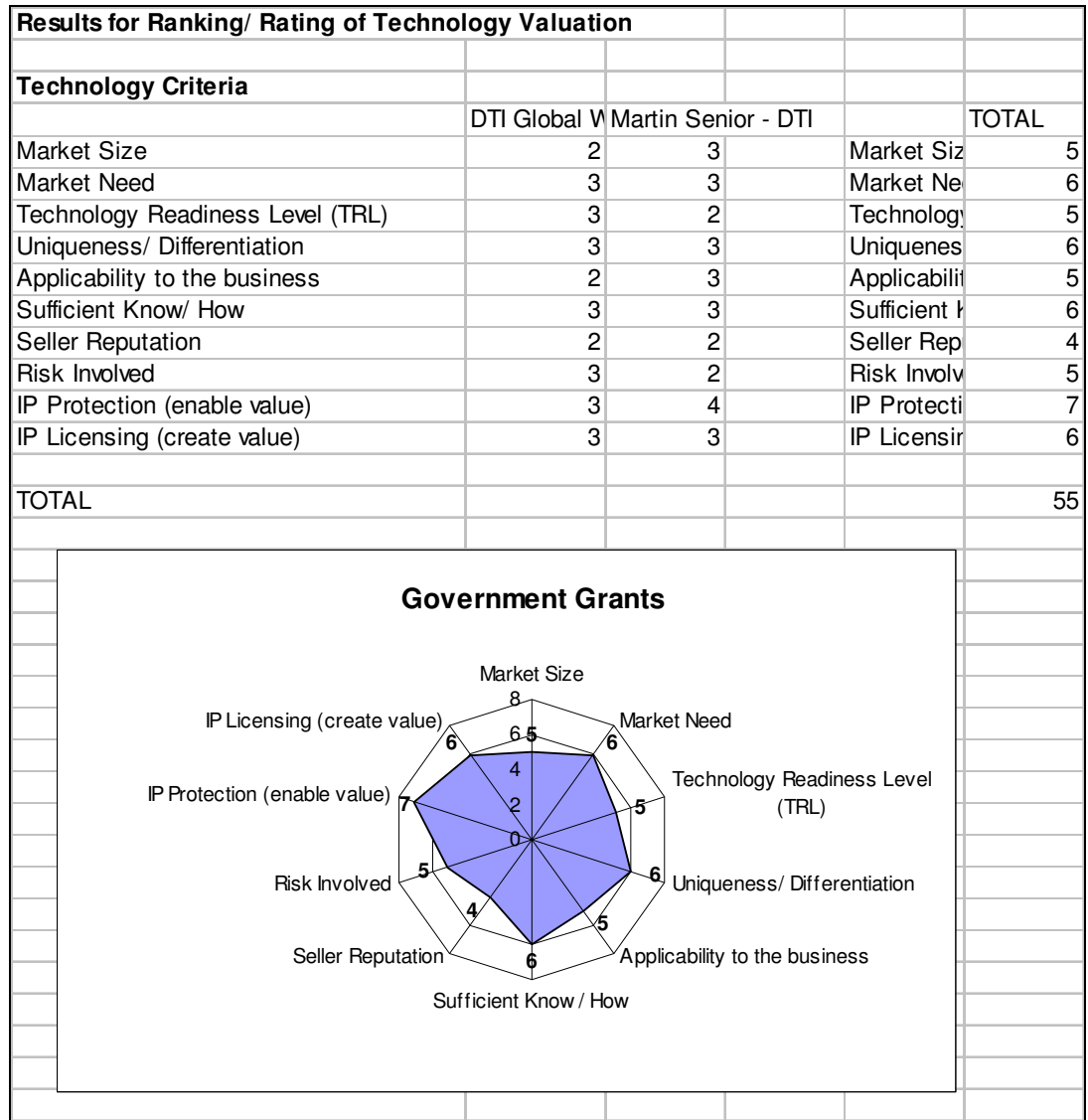
Product based early-stage companies



Service based early-stage companies



	Nicos Raftis	Lapsafe (p	Paul Baus	Tony - Xia	Campfd - C	Tim Joblin	Q-Flo - Martin	Pick		Ved - Thin	Hitec	Alloy Mall	Rishard Pr	Sorut Sun	Hendrik P	Nunima - I	Nuco Puer	Ulrich - Ob	Objective Security		
Market Size	3	4	1	2	3	4	2	4	Market Siz	21		3	3	2	3	4	4	4	1	Market Siz	27
Market Need	4	4	2	4	4	4	4	4	Market Ne	26		4	4	4	4	3	4	4	4	Market Ne	35
Technology Readiness Level (TRL)	3	2	3	3	2	3	2	2	Technology	18		3	3	3	3	1	2	3	3	Technology	24
Uniqueness/ Differentiation	4	3	1	4	4	3	4	Uniquenes	23		2	3	3	4	3	4	3	3	4	Uniquenes	29
Applicability to the business	4	3	1	3	4	3	1	Applicabili	19		2	4	4	3	3	1	3	3	4	Applicabili	27
Sufficient Know/ How	4	3	3	3	1	2	3	Sufficient P	19		2	3	2	4	2	3	2	3	4	Sufficient P	25
Seller Reputation	2	4	4	2	3	1	1	Seller Rep	17		1	4	3	2	3	1	3	2	3	Seller Rep	22
Risk Involved	3	3	3	4	3	2	2	Risk Involv	20		2	3	2	2	4	1	3	3	4	Risk Involv	24
IP Protection (enable value)	4	4	2	3	4	3	4	IP Protecti	24		3	3	2	3	3	3	3	4	1	IP Protecti	25
IP Licensing (create value)	3	2	4	2	4	3	1	IP Licensir	19		3	3	2	3	3	2	3	4	2	IP Licensir	25



## **F) Case Study 1: DCF Analysis**

# Company valuation of early-stage technology

May-June 2006

	6-Jan	6-Feb	6-Mar	6-Apr	6-May	6-Jun	6-Jul	6-Aug	6-Sep	6-Oct	6-Nov	6-Dec	7-Jan	7-Feb	7-Mar	7-Apr	7-May	7-Jun
Monthly Cash Flow	99849	-13371	2062	-5175	-5188	-2789	-5208	-5221	-2822	-5241	-5254	-8105	-12252	-8268	121838	124020	125705	71129
Discount Factor	100%	96.77%	93.65%	90.63%	88.85%	86.26%	83.75%	81.31%	78.94%	76.64%	74.41%	72.24%	70.14%	68.10%	66.11%	64.19%	62.32%	60.50%
Discounted Cash Flow	99849	-12939.12	1931.063	-4690.1	-4609.54	-2405.79	-4361.7	-4245.2	-2227.69	-4016.7	-3909.5	-5855.05	-8593.55	-5630.51	80547.1	79608.44	78339.36	43033.05

7-Jul	7-Aug	7-Sep	7-Oct	7-Nov	7-Dec	8-Jan	8-Feb	8-Mar	8-Apr	8-May	8-Jun	8-Jul	8-Aug	8-Sep	8-Oct	8-Nov	8-Dec		
128952	130654	74240	133920	135630	75658	134222	139038	82861	148761	154297	92155	164772	170467	101896	182043	188107	112849		
58.74%	57.03%	55.37%	53.75%	52.19%	50.67%	49.19%	47.76%	46.37%	45.02%	43.71%	42.43%	41.20%	40.00%	38.83%	37.70%	36.60%	35.54%		
75746.4	74511.98	41106.69	71982	70785.3	38335.91	66023.8	66404.55	38422.65	66972.2	67443.22	39101.37	67886.06	68186.8	39566.22	68630.21	68847.16	40106.53		1389883
																		NPV	966966.6

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