

IP Valuation

at the Hungarian Intellectual Property Office



Hungarian Intellectual
Property Office

2013

**IP VALUATION
AT THE HUNGARIAN
INTELLECTUAL PROPERTY
OFFICE**

IP VALUATION AT THE HUNGARIAN INTELLECTUAL PROPERTY OFFICE

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1. Practical overview of IP valuation

1.1. INTRODUCTION

Through conscious and appropriate management practices, the ownership and commercialisation of Intellectual Property (IP) has the potential to create economic benefits. In order to maximise these potential benefits, it is important to manage IP as an individual asset, with the capacity to create a stream of benefits in its own right.

With the contribution of IP to company value increasing, the systematic identification, assessment and analysis of IP assets is increasingly necessary. This process may be through the rating or scoring of assets and/or the quantification of asset value.

This publication studies the assessment and analysis of IP through the introduction of two IP valuation methods used at the Hungarian Intellectual Property Office (HIPO). We build upon our experiences gained during the IP valuation pilot project conducted in partnership with research institutions within the Hungarian Academy of Sciences.

This part (Part 1) provides a general background on the importance of valuing IP assets.

Part 2 details the issues that should be considered when selecting the most appropriate methods for the valuation of IP assets and the building-up of a valuation model.

Part 3 details the “Analysis of value drivers” method used at the HIPO.

Part 4 details the “Net present value of cash flows” method used at the HIPO.

Part 5 is a case study demonstrating the valuation of a microscope measuring system technology.

Part 6 concludes with the observations and experiences of the HIPO.

1.2. FOCUS OF THIS PUBLICATION

This publication aims to increase awareness of IP value and IP valuations method in the general context of technology transfer and the commercialisation of technology. It aims

to raise awareness of and promote value orientated thinking by the owners of IP, as well as those providing professional IP services. It is aimed at readers already familiar with IP, technology transfer and valuation concepts.

The focus of this publication is on the valuation of technology-related IP, specifically patented or unpatented technology. The terms “technology”, “intellectual property”, “IP” and “IP asset” are used as synonyms.

There is a focus on the valuation of IP bundles which, alongside the core technology also include complementary intangible assets, including know-how and software. This is referred to as an “IP bundle” or “technology bundle”.

1.3. DEFINITION OF AN IP ASSET

An asset is a resource that is controlled by an entity (such as a company) as a result of past events (for example, purchase or self-creation) and from which future economic benefits (inflows of cash or other assets; or reduction in costs) are expected.¹

An intangible asset is an asset that manifests itself by its economic properties. It does not have physical substance but grants rights and economic benefits to its owner.²

Legal intangible assets are known under the generic term Intellectual Property (IP) and generate legal property rights defensible in a court of law.³ The IP legal framework consists of specific registered IP rights (IPRs) such as patents and trademarks as well as non-registered rights such as copyright.

IP assets can be identified, separated, are transferable and have an economic life. Whilst the legal right grants exclusivity or the right to exclude, the economic right is based on exclusivity of use, that is, the ability to control the use of the IP.⁴

It is important to note that when we talk about an IP asset, we are referring to an innovative solution which is protected by an IP right. The valuation of a patent for example is the valuation of the technology described in the claims of the patent document (the technology itself) together with the legal right to exclude (the patent protection per se).

For more information on the definitions of IP, see resources in the bibliography.

1.4. BUNDLES OF IP AND INTANGIBLE ASSETS

While an IP asset such as an individual technology can be identified and separated, in most cases it will be supported by complementary intangible assets. These supporting assets are often significant in generating cash flow. For example, a technology protected by a patent can often be complimented by trade secrets, proprietary processes and copyrighted

¹ World Intellectual Property Organisation: IP Panorama, downloaded 2012.

² International Valuation Standards Council: International Valuation Standard 210, 2011.

³ Wikipedia: Encyclopedia entry for “Intangible asset”.

⁴ World Intellectual Property Organisation: IP Panorama, downloaded 2012.

software. Taken individually many of these assets would have at least some value. Taken together as a bundle, the sum is often greater than the individual parts.⁵

In affect, unless a specific reason exists, the focus of any IP valuation is on a bundle of revenue generating assets, with the subject IP asset at the core.

1.5. THE VALUE OF IP ASSETS

For an IP asset to have value, it should generate a measurable amount of economic benefit to the IP owner and / or enhance the value of other assets with which it is associated.

The use of an IP asset through incorporation in a product or process can create incremental benefits through increasing revenue and/or reducing costs. For example, the incorporation of advanced hardware into a smartphone may create product differentiation and allow it to be sold at a higher price than without the hardware. Alternatively, the use of an advanced manufacturing process may reduce the production cost of the smartphone. Either way, economic benefits will increase due to the use of the IP.

Most importantly, the value of IP derives, in essence, from the ability of associated rights (such as patents, trademarks and industrial designs) to exclude others from using the IP. The advanced hardware may only be incorporated into smart phones by manufacturer “A” (the owner of the IP). Manufacturer “B” may not use the hardware in its own smart phones without infringing manufacturer “A”’s rights. The economic benefits from the IP for manufacturer “A” are, therefore, maintained through legal protection. This ability to exclude others from the benefits of the IP is a key driver of IP value.

The “non-use” of an IP asset may also generate economic benefits for the IP owner. If IP rights are used by others without authorisation, successful legal proceedings may force the unauthorised user to pay damages to the owner of the IP.

1.6. WHY VALUE IP?

Corporate and legal environments have evolved jointly to a level where intangible assets (including IP) are now the significant factor in the strength and growth of companies, industries and entire economies.

Since IP has significant potential to create economic benefits, conscious and appropriate management of these assets is needed at all levels. This practice of value-oriented management should include in some form, the systematic identification, assessment and analysis of IP assets and portfolios, in short a “valuation”.

IP assets can be valued for a broad set of purposes, from making decisions about whether to file a patent to using the IP as collateral for a bank loan, and by a broad set of stakeholders. Patent owners, licensees, financial analysts, and venture capitalists are all involved in valuing IP. The need for monetary valuations of patents becomes particularly relevant when

⁵ Anson, W.: Intellectual Property Valuation Primer, 2004.

they are used as financing tools by patent holders or as investment assets by financial institutions and venture capitalists.⁶

Some scenarios where a valuation of IP assets may be required:

- estimating the commercial prospects for early stage research and development (R&D),
- valuing R&D efforts, results and prioritising research projects,
- making decisions related to investment into IP asset development and commercialisation,
- pricing IP asset for licencing or sale,
- quantifying the equity allocations in the formation of a business or joint venture where one or more parties contribute IP assets,
- estimating the value of an IP asset used as collateral in cash flow-based or asset-based debt financing,
- measuring economic damages or lost profits in IP infringement claims,
- making informed financial decisions about IP asset maintenance and commercialisation,
- evaluating potential merger or acquisition candidates,
- identifying and prioritising assets that drive company value.

1.7. THE VALUATION OF IP ASSETS

A valuation is the process of determining or measuring reliably the value or worth of an asset in certain circumstances.

Various methods have been developed to value IP, each using greater or lesser amounts of economic theory. Commonly used methods can be categorised as being either quantitative or qualitative in their approach to valuing IP.

Quantitative methods attempt to calculate the monetary value of the IP and include cost, market and income-based approaches. Within each of these approaches there are numerous different methods developed for specific contexts. The results of these methods will be a value range for the IP, expressed in money.

Qualitative methods provide a guide to value for the IP through the rating and scoring of the IP asset or factors which can influence its value. Again, there are numerous methods presently used, each with different degrees of complexity. With these methods, the valuation results will be a descriptive analysis and/or a score for the IP.

The valuation of IP assets is complicated by the fact that no two assets are the same. This is inherently the case when IP is protected by rights such as patents and trademarks. A requisite for receiving such protection is that the IP does not already exist. This fact makes comparisons with other IP for valuation purposes difficult.

⁶ Otsuyama, H.: “Patent Valuation and Intellectual Assets Management”, in Samejima, M., ed., Patent Strategy Handbook, 2003.

The methods used most often are based on assumptions as to what an IP asset's future may look like, what important milestones will be met and strategic decisions taken. Most IP valuations are thus based on envisioning the future use of an IP asset.

To date there are no universally accepted and used methodologies for the valuation of IP assets, however, there are number of standards which may be followed.⁷

1.8. IP ASSET VALUATION AT THE HUNGARIAN INTELLECTUAL PROPERTY OFFICE (HIPO)

The development of IP valuation methods and toolbox is in line with the HIPO's aim of supporting innovative and creative activity, and the valorisation of resulting IP assets.

The valuation of IP assets is important to and benefits the work of an expanding range of professional groups. They include innovative enterprises, creative enterprises, research institutes, technology transfer professionals, IP professionals, valuation professionals, accountants, academics, consultants, regulators and tax authorities. The HIPO and partners are active in the development and continuous adaptation of international "best practice" IP valuation methodology through understanding the different interests of these groups. The HIPO is active in supporting stakeholders in conducting valuations of specific IP assets.

1.9. THE IP VALUATION PILOT PROJECT

To address the issues regarding the valuation of IP assets developed at research institutes, the HIPO in cooperation with the Hungarian Academy of Sciences initiated a pilot project.

The focus of the pilot project was on the valuation of patentable technology and IP "bundles". The aim of the project were to test a set of methods that can enable individual research institutes to more easily and accurately value their IP and provide assurances of the validity of the valuation.

Between 2009 and 2012 a number of technologies developed at the research institutes of the Academy were valued. One of these valuations is demonstrated in Chapter 5 of this publication.

The toolbox which was the result of the project is intended to be used by research institutes and technology transfer offices, as well as IP professionals.

In Brief:

For an IP asset to have value, it should generate measurable amount of economic benefit to its owner/user and or enhance the value of other assets with which it is associated.

An IP valuation is the process of determining or measuring reliably the value or worth of an IP asset in certain circumstances.

⁷ See DIN: DIN 77100:2011-05, Patent valuation – General principles of monetary patent valuation and International Valuation Standards Council: International Valuation Standard 210.

The valuation of IP assets is important to and benefits the work of an expanding range of professional groups. They include innovation-intensive enterprises, creative enterprises, research institutes, technology transfer professionals, IP professionals, valuation professionals, accountants, academics, consultants, regulators and tax authorities.

To date there are no universally accepted and used methodologies for the valuation of IP assets, however there are number of standards which may be followed.

The HIPO and partners are active in the development and continuous adaptation of international “best practice” IP valuation methodology through understanding the interests of the different professional groups. The HIPO is active in supporting stakeholders in conducting valuations of specific IP assets.

2. Selecting the appropriate IP valuation methods and building-up the valuation model

2.1. SELECTING THE APPROPRIATE IP VALUATION METHODS

The first step when conducting an IP valuation is to select the most appropriate valuation method(s) to use. The selection will depend on the characteristics of the IP asset, the commercialisation environment, and the type of value results required.

Many IP valuation methods exist, and there is no single best way to value an IP asset. Considering that each valuation is highly context specific, an appraiser must be able to select the most appropriate one and adapt it to the specific circumstances.

For more information about the different methods available, see the general publications on IP valuation listed in the bibliography.

2.2. COMBINATIONS OF METHODS

To increase the accuracy of the valuation, an IP asset may be valued using two or more independent valuation methods. Having more than one set of results can give a more robust range of values and can bridge some obstacles in the availability and accuracy of information. The combination of methods in an IP valuation is regarded as good practice.

- The combination of a cost-based and an income-based method may give a good range of value for a licensing negotiation.
- Using two independent income-based methods giving similar results may provide assurances of an accurate valuation.
- A market-based method in combination with an income-based method may give a valid indication of value from different perspectives.
- The combination of qualitative and quantitative methods can give a detailed insight into how the IP value is built up, useful for making decisions.

2.3. COMPLEXITY LEVEL AND QUALITY OF METHODS

After selecting the most appropriate valuation method(s) to use, the appraiser will decide how comprehensive each method will be. The “complexity level” of each method is a key issue as it will affect the quality of the results generated.

The complexity level of the valuation will depend on:

- the quality and type of results required to fulfil the valuation purpose,
- the availability and accuracy of input data, and
- the resources (human, financial, time) available for the valuation.

| Level of complexity for IP valuation method | Low level (simplified version) | High level |
|---|---|---|
| Appraiser | Appraiser can be in-house team member, does not have to be an IP valuation expert | Appraiser should be independent IP valuation expert |
| Availability and accuracy of input data | Can make assumptions and extrapolate data if no reliable data is available | Must have high quality input data from reliable and verifiable sources |
| Human resources required | Input data can be sourced in-house | Working group consisting of experts in specific fields is desirable to provide input data. Can use purchased market data. |
| Financial resources required | Low (due to less strict input data requirement) | High (due to cost of experts) |
| Time resources required | Low (can be performed within 1 week) | High (requires data collection and analysis) |
| Quality of expected results | Low level (suitable for initial assesment) | High level |

The quality of the results from the IP valuation will depend on the availability and accuracy of input data. The quality of input data will be influenced in part by the resources allocated to the valuation. There is a constant trade-off between the need to have the highest quality results and the information and resources available for the valuation.

In most cases an initial assessment, using basic methods requiring data already available to the client are preferable. If further and more in depth results are required, more complex methods may be used.

For example, less comprehensive basic valuations are preferable for large IP portfolios, or where monitoring of IP value over a period of time is required. On the other hand, the valuation of a stand alone IP asset for a specific purpose of licensing would require a more in-depth quantitative valuation, using purchased market data and external experts in specific fields.

The use of valuation methods with different levels of complexity will make the best use of resources available while still fulfilling the purpose of the valuation.

2.4. ASPECTS CONSIDERED WHEN SELECTING IP VALUATION METHODS AND LEVELS OF COMPLEXITY

The selection of the most appropriate method(s) for a valuation and the complexity level of each method require consideration of the aspects listed below.

2.4.1. Valuation date

The IP valuation must be conducted for a specific date, agreed to by all parties. Specifying a date is important to ensure a clear reference point for all the input data in the valuation.

2.4.2. Definition of IP assets, IP rights and associated intangibles

The IP asset to be valued must be identified and separated from other tangible and intangible assets. The specifications of the IP asset must be agreed to by all parties.

If there are complementary assets which will support the IP asset in generating benefits, such as know-how or software, these must also be specified. If supporting intangibles are also valued together with the IP asset, then the valuation is of an IP bundle.

The type and content of the IP bundle will affect the choice of methods used, as different IP assets add value in different ways.

2.4.3. Purpose of the valuation

A valuation will in all cases fulfil some specific set of objectives. Usually the valuation results will provide information in order to better accomplish a specific task with the IP asset, make a decision related to the IP asset or communicate the significance of the IP asset.

A valuation may be required for different purposes such as:⁸

- management of IP (for example decision-making about development routes, protection strategies, commercialisation routes),
- transactions involving IP assets (for example purchase or sale of IP, licensing or transfer of use-rights),
- as part of a company valuation (for example mergers and sales of businesses or parts of businesses where there is a significant IP component),
- litigation (for example calculating damages in case of IP infringement),
- accounting and reporting purposes,
- financing and raising capital (for example IP securitisation, IP as collateral for loans),
- communication (for example to communicate the significance of the IP asset to prospective partners),

⁸ Adapted from International Valuation Standards Council: International Valuation Standard 210, 2011.

- value creation (for example adding value to the IP asset through decreasing risk related to successful commercialisation).

The valuation method(s) used will be selected so that they provide results suitable for the purpose of the valuation. For example, assisting management decisions may require only non-monetary results, so a qualitative method is ideal. A valuation to assist with setting up license deals will often require a monetary valuation, so a quantitative method will be required.

The purpose of the valuation will help establish the premise of value to be used in the valuation.⁹ The premise of value is an assumption regarding the most likely set of transactional circumstances that may be applicable to the valuation. Common premises of value include value in use, value in exchange (orderly disposition) and value in exchange (involuntary liquidation). Most often the premise of value chosen for a valuation will reflect the highest and best use of the IP asset.

2.4.4. The client (the beneficiary of the valuation)

The client for the valuation will influence the information sources and the resources available for the valuation. If the client is the owner of the IP, a bias may be introduced into the valuation and this must be accounted for by the choice of method complexity.

2.4.5. The appraiser

An IP valuation may be conducted “in-house” by the owner of the IP or by external valuation professionals. Any affiliation between the person conducting the valuation and the owner of the IP asset can introduce a bias into the valuation. The use of an external professional will result in more independent results, which may be a requirement for the valuation (see 2.4.3. Purpose of the valuation). An in-house valuation may result in biased results but will require fewer resources (see 2.4.8. Resources available for the valuation).

The method and complexity level selected for the valuation will reflect the affiliation of the appraiser and his/her expertise related to a) valuation methodologies used and b) the technological area of the subject IP.

2.4.6. Definition of target audience for the valuation

The valuation method and complexity level chosen will reflect the information needs, expertise and experience of the target audience. Different types of valuation methods and results may be required if the target audience is internal management or a potential licence partner.

⁹ For a more details on the premise of value used in an IP valuation see Reilly, R.: Intellectual Property Valuation Considerations, 2012.

2.4.7. The availability and accuracy of input information

The most important factor to consider when selecting the appropriate method to use is the availability of relevant, accurate input data. It is impossible to conduct a valuation if for example relevant development and market data are not available.

If the client is the IP owner, then the appraiser should have the support of the research team, management and intermediaries to supply information during the valuation process. If a client requests a valuation of an IP asset where they have no ownership or use rights, important packets of input data required for the valuation may be difficult or expensive to acquire.

The selection of method(s) and their level of complexity will reflect the availability and cost of acquiring relevant input data for the valuation. Methods are chosen in order to maximise the sources of data available and to compensate for any missing data.

2.4.8. Resources available for the valuation (human and financial resources, time)

The human, financial and time resources available for the IP valuation will also significantly affect the choice of method and level of complexity. There will always be a trade off between the quality of the results required and the resources that are available.

Both qualitative and quantitative methods require specific bundles of input data and the accuracy of the valuation depends on the quality of data available.

For a comprehensive complex level valuation, experts from different professional areas (scientific, legal, industrial property, market) may be used to provide data. The resources required to conduct such a comprehensive valuation may be significant. A valuation conducted with limited resources will produce lower quality results.

In brief:

When conducting an IP asset valuation, the appraiser must select:

- the most appropriate method or combination of methods to use, and
- the complexity level of each method.

The choice of method and complexity will determine the quality of the valuation results.

In order to make the selection, the appraiser must consider a number of key aspects:

Valuation date – when will the valuation take place?

Definition of IP assets, IP rights and associated intangibles – what IP asset or bundle of IP assets is being valued?

Purpose of valuation – why is this IP asset or bundle of IP assets being valued?

The client – who will be the beneficiary of the valuation?

The appraiser – who will conduct the valuation?

The availability and accuracy of input information used in the valuation – is all the required information available to the appraiser?

Resources available for the valuation (human, financial, time) – what resource constraints are there for the valuation?

2.5. BUILDING UP TO THE VALUATION MODEL

At the beginning of any IP valuation process the appraiser, together with the client, will build up a valuation model. The model will reflect a specific commercialisation scenario for the IP asset. Most importantly it will show how revenue will be generated, costs saved and profit made from the IP asset.

The model is the simplest when the IP asset is incorporated into a standalone product or process with discrete revenues and costs. The majority of IP, however, will be included as a small part of a product or process. It is therefore essential to determine the contribution of the IP asset to any differentiation and cost advantage.

2.5.1. Definition of application(s) and end-market(s)

In order to build up the valuation model, applications for the technology and end-markets for any products and processes must be specified.

An IP asset may be valued for a specific application and end-market where it is already being used. Alternatively, the asset may be valued under a specific use that differs from the historical usage. In cases where an IP asset has not yet been used, a “best use” concept is often applied. Here the IP asset is valued in applications and end-markets where it will generate the highest benefits under foreseeable circumstances.

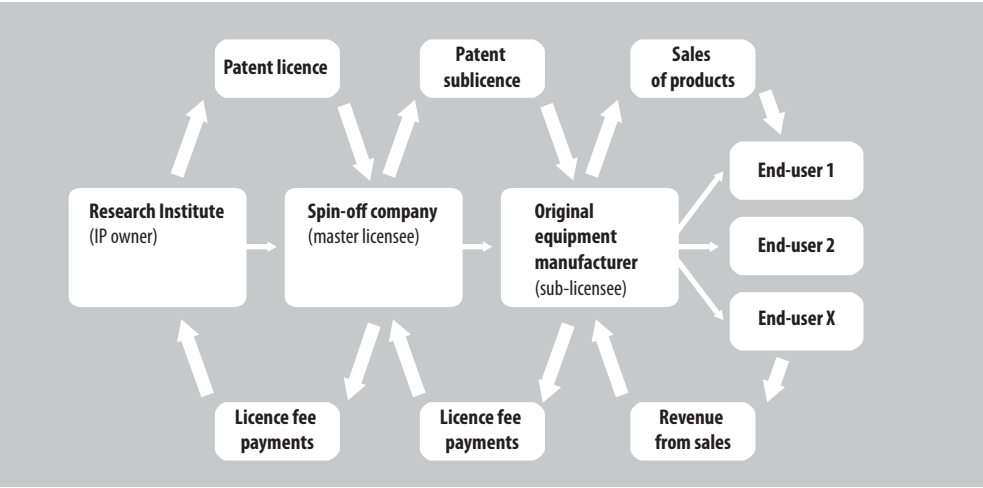
2.5.2. Definition of commercialisation route

A commercialisation route may involve the IP owner developing a product or process which incorporates the IP and selling directly to the end-user.¹⁰ Alternatively, through a licensing transaction the rights to use the IP may be passed along a chain from the IP owner along a number of intermediaries (spin-off companies, manufacturer) before it reaches the end-user. Revenue from the IP asset may be passed back down the commercialisation route in the form of royalty payments until it reaches the owner (for an example, see Diagram 1 below).

The commercialisation route followed must be agreed upon by all parties in the valuation and forms an integral part of the valuation model.

¹⁰ Note: the owner's strategy may involve the non-use of the IP asset. There is also the possibility to model this non-use scenario.

Diagram 1: An example of a commercialisation route for a patented technology



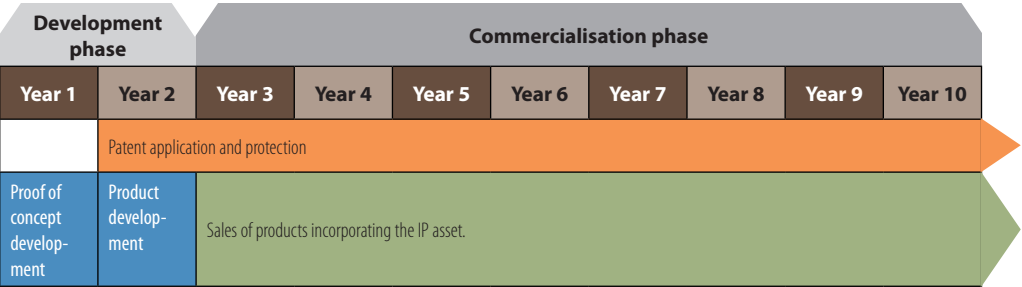
2.5.3. Definition of IP asset development and commercialisation timeline

Next, a realistic timeline for the development and the commercialisation of the technology must be identified.

Diagram 2 below shows a simplified example of a technology bundle where the economic life of the product incorporating the IP is 10 years from the valuation date. The first two years would involve the development of the IP asset and the product. Sales of the product will begin in year 3 and continue until the end of year 10. A patent will be applied for at the beginning of year 2.

The development and commercialisation timeline must be agreed upon by all parties in the valuation.

Diagram 2: An example of a timeline of technology development and commercialisation



In brief:

Before a valuation can take place, the appraiser and the client must agree to a valuation model.

The valuation model will reflect a specific commercialisation scenario for the IP asset. It will include a definition of applications and end-market for the IP asset, the definition of the commercialisation route and a timeline.

Most importantly the valuation model will determine how revenue will be generated, costs saved and profit made from the IP asset.

3. “Analysis of value drivers” method used at the Hungarian Intellectual Property Office

IP VALUATION METHODS USED AT THE HUNGARIAN INTELLECTUAL PROPERTY OFFICE

The Intellectual Property (IP) valuation methods used by the Hungarian Intellectual Property Office (HIPO) are intended for the valuation of patented and non-patented technologies.

The current toolbox contains a number of methods which can be selected to give results for specific valuation purposes (see 2.1. Selecting the appropriate IP valuation methods).

The “Analysis of value drivers” method is described below.

3.1. QUALITATIVE IP ASSET VALUATION: “ANALYSIS OF VALUE DRIVERS” METHOD

The “Analysis of value drivers” method is a qualitative valuation approach. It provides an insight into many of the independent and interdependent factors which drive the value of a technology. The method is based on the analysis and the rating of a technology and the potential for its successful commercialisation. It examines:

- the quality of the technology itself,
- the quality of related research and development environments,
- the quality of related commercialisation environments,
- the quality of protection (IP rights and other forms) for the IP asset, and
- the end-market for the product or process incorporating the IP asset.

3.1.1. How does the “Analysis of value drivers” method determine IP value?

There are a number of key factors which make an IP asset valuable. The quality of these factors will influence successful commercialisation, and the ability of the IP to create benefits for the IP owner. These factors will influence or “drive” the value of the IP asset either positively and negatively.

A good way to understand the significance of value driving factors is to consider a tangible asset, such as a house. Factors such as its location, the numbers of rooms it has and the demand for room rentals will influence the value of the house. In the same way, key factors related to an IP asset will influence the value of the IP asset (see Diagram 3 below).

In the “Analysis of value drivers” method, the value of an IP asset is linked to how the IP asset performs in six key categories, listed below. Specific factors within these categories are individually analysed and scored.

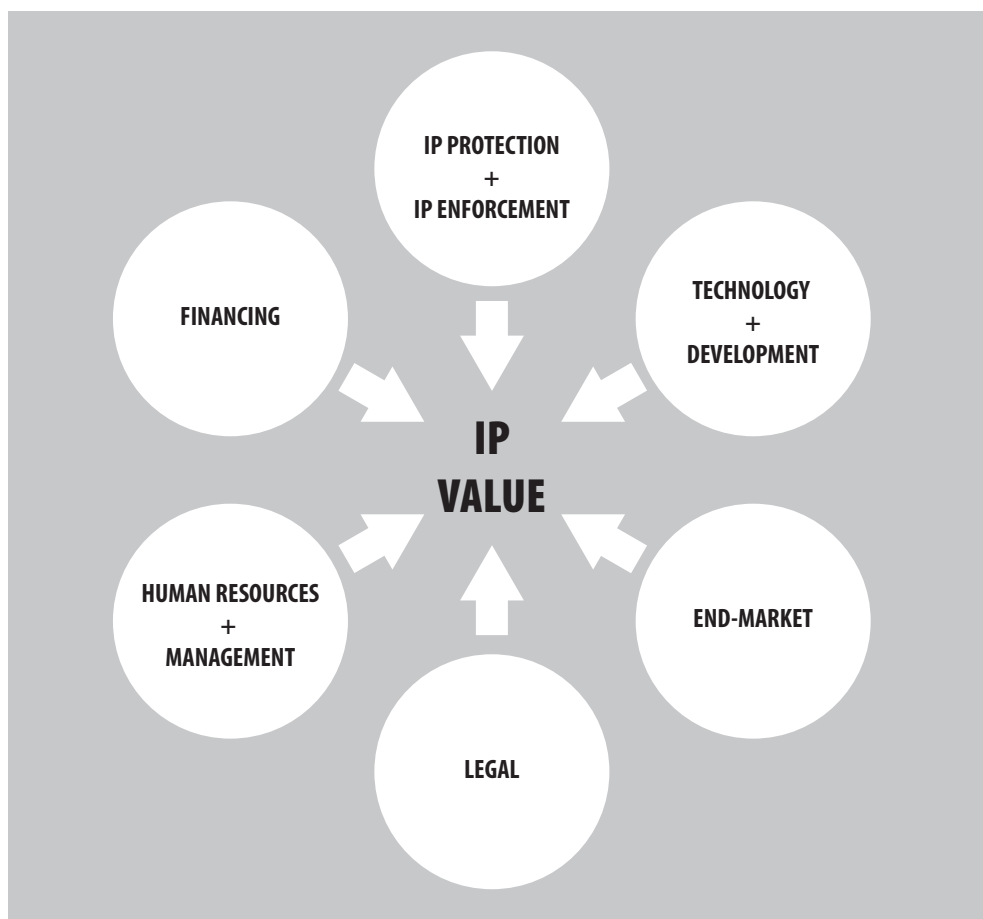


Diagram 3: Factors driving IP asset value, in six key categories

3.1.1.1. TECHNOLOGY and DEVELOPMENT factors

These value driving factors relate to the quality of the technology itself. Factors analysed and scored include the complexity of the technology, dependence on other technologies, availability of complementary assets, stage of development, uniqueness and a comparison to other available technologies.

3.1.1.2. IP PROTECTION and IP ENFORCEMENT factors

Factors in this category relate to how the technology is protected by IP rights, as well as non-IP rights-related protection strategies. The possibilities for the enforcement of any IP rights and the ability of the owners to maintain and enforce IP rights are also analysed and scored. Factors include the status and scope of IP protection, the "copyability" of products or processes incorporating the IP asset, and the possibilities for identifying infringement.

3.1.1.3. LEGAL factors

These factors analyse specific legal aspects related to the ownership of the technology, IP rights and use-rights. Factors analysed and scored include the definition of the owner and quality of the relationship between the owner and any commercialising partners.

3.1.1.4. HUMAN RESOURCES and MANAGEMENT factors

This category of factors analyses the human resources available for the commercialisation of the technology, the management of the technology, the competences of the IP owner to commercialise the technology and the management of the technology in general. Factors analysed include the IP owner's management experience, knowledge of application potential for the technology, networks, and the support of research and development staff in the commercialisation process.

3.1.1.5. FINANCING factors

Factors in this category relate to the financial resources available for the development and commercialisation of the IP. Factors analysed include the ability of the IP owner to cover the costs of commercialisation and prospects for external investment.

3.1.1.6. END-MARKET factors

These factors relate to the conditions of the target end-market for the product or process incorporating the technology. Factors analysed include the number and quality of applications for the technology. Other factors analyzed include potential end-market demand for products incorporated the technology, competition in the market sector and market willingness to pay.

3.2. STEP BY STEP GUIDE TO USING THE “ANALYSIS OF VALUE DRIVERS” METHOD

The “Analysis of value drivers” method follows these basic steps:

- a) The valuation model is built-up and agreed to by all parties (See 2.5. Building up the valuation model).
- b) The level of complexity for the method is determined according to the purpose of the valuation, the availability and accuracy of data and the availability of resources (see 2.3. Complexity level and quality of methods).
- c) The relevant factors which drive value in the case of the technology bundle are identified. If the purpose of the valuation is to directly compare the IP asset with other technologies, then a standard list of approximately 45 factors are used in the 6 categories detailed above.
- d) Objective and subjective data about each factor is collected from the client, the members of the working group and external sources.

With each factor the quality of the technology in comparison to a “best case” scenario is considered. The following points are considered:

- i. the present status of each factor related to the IP asset (objective data),
 - ii. uncertainties related to each factor (subjective data),
 - iii. opportunities related to each factor (subjective data),
 - iv. opportunity / uncertainty score for each factor, on a linear scale between -5 and +5 (subjective data).
- e) The input data is analysed for each factor and collectively for the technology.

3.3.RESULTS OF THE “ANALYSIS OF VALUE DRIVERS” METHOD


The results of the method are:

- *factor-by-factor analyses* of all the value driving factors related to the technology,
- *an uncertainty-opportunity “matrix”* graphically compiling all the value driving factors related to the technology,
- *an uncertainty-opportunity “profile”* of the technology.

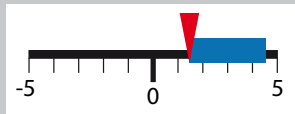
3.3.1. Factor-by-factor analyses

Each factor related to the technology is analysed and scored individually. The analysis includes the objective data (for example the present status of the factor) and subjective results (for example an uncertainty related to the factor). Finally, the factor is given an uncertainty / opportunity score on a linear scale between -5 and +5 (see Box 1 for an explanation of the scoring system).

The results for each factor are presented in the following format:

| Factor No. Factor name Factor description |
|--|
|  <p><i>Factual description of relevant aspects of the technology related to the factor</i></p> <p>U: <i>Uncertainties of the technology in relation to the factor</i></p> <p>O: <i>Opportunities of the technology in relation to the factor</i></p> <p><i>Analysis of the factor's contribution to value</i></p> |

Box 1: Explanation of the scoring system



Each factor related to the technology is given an uncertainty / opportunity score (on a linear scale between -5 and +5). The best-case scenario relating to the factor would receive a score of +5, while the worst-case scenario would receive a score of -5. The subjective status of the factor will be represented by a score between these two extremes.

A score of zero shows that the situation of the factor is neutral. This situation does not represent an uncertainty or an opportunity. The situation is under control and well managed.

A score below zero shows that there is an uncertainty related to the factor. This uncertainty can have a negative effect on commercialisation and can decrease the value of the technology. Factors with a score below -1 deserve immediate attention and should be managed.

A score above zero shows that there is an opportunity related to the factor. The opportunity can have a positive effect on commercialisation and can increase the value of the technology.

The further away from the neutral line that the score is located the greater the uncertainty or the opportunity.

A post-valuation change in the situation of the technology can move the uncertainty factors towards zero and eventually make them into opportunities.

If more than one expert is asked to provide input data about the IP (for example if a working group is used) the blue bar will represent the range of expert opinion. In the example above, the score given by one expert is 1.5, while another gave a score of 4.5. The length of the blue bar shows the range of opinion.

The red triangle represents the opinion of the expert with the most expertise in the

category of the factor. For example, an industry expert may have more knowledge about market-orientated factors than the R&D team leader. The red triangle therefore shows the most likely status of the factor, according to the working group member most knowledgeable in the field.

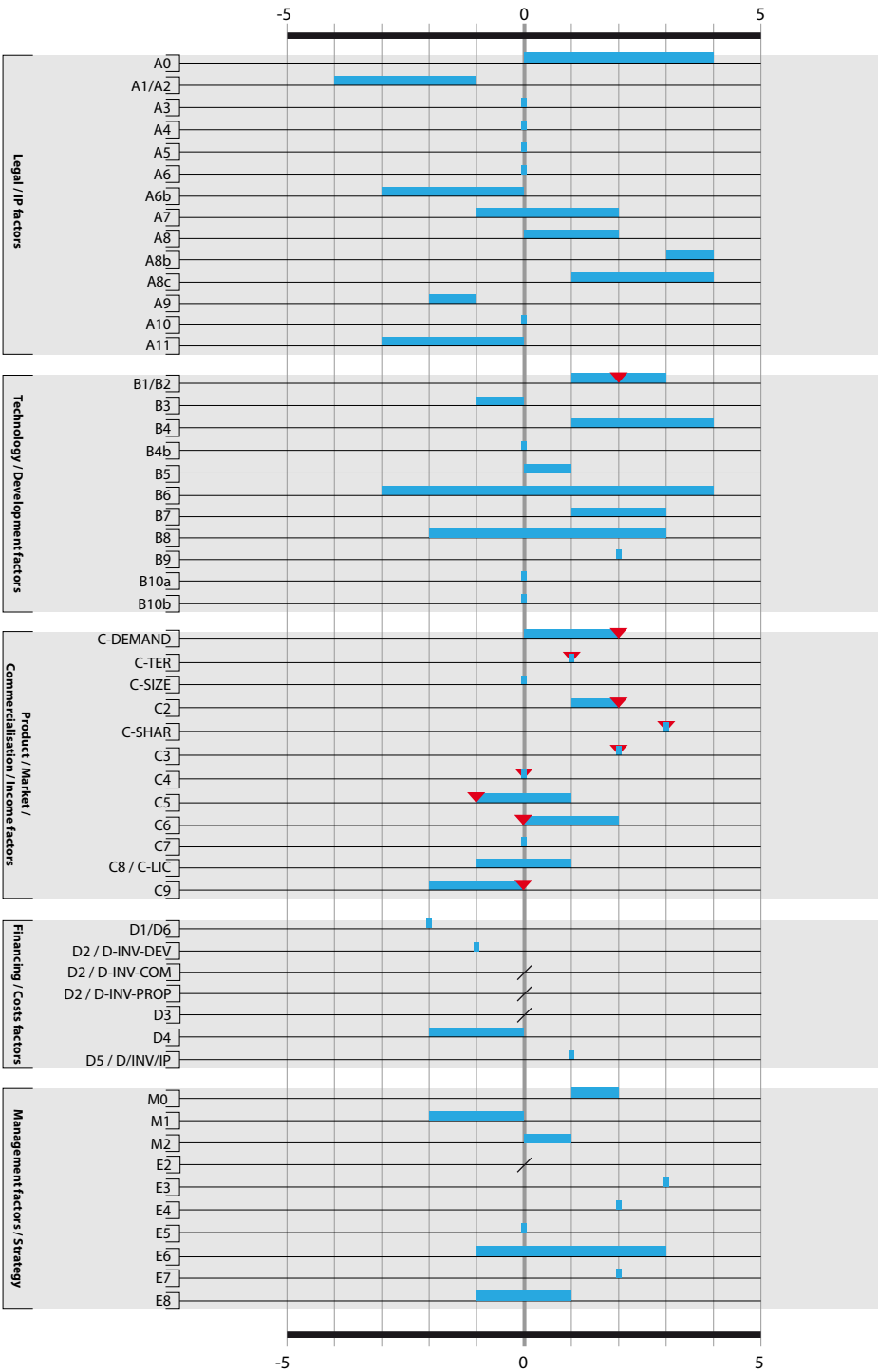
3.3.2. Uncertainty-opportunity matrix

The matrix compiles the uncertainty / opportunity scores of all the factors, graphically on a single diagram (see Box 2). It is intended to provide a complete, one page visual representation of the results. See Box 1 for explanation of the scoring system used.

3.3.3. Uncertainty-opportunity “profile”

The *uncertainty-opportunity “profile”* of the technology is the analysis of the most prominent uncertainties and opportunities in each of the six categories. The profile shows only the most significant uncertainties (-) and opportunities (+) in each category. For easy reference, the profile is limited to two pages of the valuation results report.

Box 2: Example of the uncertainty-opportunity matrix



3.4. WHEN IS THE “ANALYSIS OF VALUE DRIVERS” METHOD USED?

The “Analysis of value drivers” method can be used to provide value results for standalone IP assets or IP “bundles” comprising of a core technology supported by other intangibles. The method can be used when the purpose of the valuation requires descriptive and qualitative results (see 2.4.3. Purpose of the valuation).

3.4.1. Management of IP assets / decision-making

The results of the method can effectively support management in making resource allocation decisions and in developing IP protection strategies. The quality of the IP asset is highlighted in six independent categories for easy reference. The deconstruction of the IP asset into value driving factors is also useful for factor-by-factor comparisons with other technologies.

3.4.2. Communication

The results of the method can be used to communicate the significance of the IP within the owner’s organisation and to external partners. The valuation results may be presented to potential licence partners as an independent opinion about the quality of the IP. The uncertainty-opportunity profile and uncertainty-opportunity matrix provide the results of the valuation graphically and in concise form. Where problem areas are highlighted, in-depth details can be found in the factor-by-factor analysis.

3.4.3. Value creation

The results specifically identify areas where the IP asset is the weakest and provides a clear indication of issues which could pose a problem during commercialisation. Changing certain factors post valuation can reduce uncertainty related to successful commercialisation and ultimately add value to the IP asset.

3.5. COMBINATIONS OF METHODS

The method can be effectively used by itself or in combination with other valuation methods. For example, the use of the “Analysis of value drivers” method in combination with an income-based method can greatly enhance a strictly quantitative valuation with insight into the factors that are driving IP value.

3.6. LEVELS OF COMPLEXITY

The use of the “Analysis of value drivers” method was developed primarily for use by an appraiser with thorough about knowledge IP valuation and the technology transfer processes. The expertise of the appraiser related to a) valuation methodologies used and b) the area of the subject IP asset will have a significant impact on the valuation.

A simplified version of the "Analysis of value drivers" method can be used for a quick, no frills valuation of an IP asset. It is especially useful when human, time and financial resources are limited or accurate input data is not available to conduct a full valuation. This low complexity level version can be performed by an in-house appraiser following a handbook, and the input data may be sourced in-house. The results will give a good indication of the uncertainties and opportunities related to the commercialisation of the technology. However, the simplified method can provide low quality results, due to the sources and quality of the input data.

In brief:

The "Analysis of value drivers" method is intended for the valuation of patented and non-patented technologies or technology "bundles".

In the method, the value of an IP asset is linked to how the IP asset being valued performs in six key categories. Specific factors within these six categories are individually analysed and scored.

The results of the method are *factor-by-factor analyses* of all the value driving factors related to the technology, an *uncertainty-opportunity "matrix"* graphically compiling all the value driving factors related to the technology and *uncertainty-opportunity "profile"* of the technology.

The results of the method can be used for management of IP assets and decision-making at various times during the commercialisation process. The method is suited to communicate the significance of the IP asset within the owner's organisation and to external partners. The results of the valuation may be used to add value to the IP asset through decreasing the uncertainty related to successful commercialisation.

4. “NPV of cash flows” method used at the Hungarian Intellectual Property Office

IP VALUATION METHODS USED AT THE HUNGARIAN INTELLECTUAL PROPERTY OFFICE

The Intellectual Property (IP) valuation methods used by the Hungarian Intellectual Property Office (HIPO) are intended for the valuation of patented and non-patented technologies.

The current toolbox contains a number of methods which can be selected to give results for specific valuation purposes (see 2.1. Selecting the appropriate IP valuation methods).

The “Net present value of cash flows” method is described below.

4.1. QUANTITATIVE IP VALUATION: “NET PRESENT VALUE OF CASH FLOWS” METHOD

The “Net present value of cash flows” method is an income-based approach used for calculating the value of an IP asset in money terms. It determines value by considering and discounting the future economic benefits that could actually or hypothetically be gained by a market participant owning the asset.¹¹ The resulting net present value (NPV) is considered to be equivalent to the value of the asset.

In order to arrive at a value, the method considers the remaining useful life (RUL) of the IP asset, the revenues attributed to the IP asset, the costs attributed to the IP asset, and the cash flow generated by the IP asset at each period of its RUL. The method also considers the risks related to the generated cash flows.

¹¹ International Valuation Standards Council: International Valuation Standard 210, 2011.

4.2. INPUT DATA REQUIRED FOR THE "NET PRESENT VALUE OF CASH FLOWS" METHOD

4.2.1. Remaining useful life (RUL) of the IP asset

The remaining useful life (RUL) of an IP asset is the length of time that the technology is likely to remain in use within the industry sector or relevant market. It signifies how quickly better technologies are developed and introduced. The RUL is often bounded by the legal life of any patents but is generally much shorter.

A number of factors are considered in determining the RUL, including:

- the expected usage of the IP asset,
- the RULs of similar IP assets that are utilised in a similar way,
- typical product life cycles for a product incorporating similar IP,
- technical, technological, commercial or other types of obsolescence,
- changes in the market demand for the products or processes incorporating similar IP,
- expected actions by competitors or potential competitors,
- the stability of the industry and end-markets,
- ability of the technology to adapt to changes in market conditions, and
- the level of maintenance expenditure required to obtain the expected projected economic benefits from the IP asset.

4.2.2. The projected revenues (incoming cash) attributed to the IP asset and their timings

Revenues (incoming cash) from the IP asset will be received by the IP owner at different periods corresponding to the commercialisation of the technology. Revenues from the IP asset are considered from the date of the valuation to the end of the RUL.

The commercialisation route will determine how the IP owner will receive revenues from the commercialisation of the IP asset. Whatever commercialisation route is modelled for the valuation, it is important to determine only the revenue contributed by the IP. Identifying and separating this revenue from the general revenue stream of a project or business unit is essential for the IP valuation to be accurate.

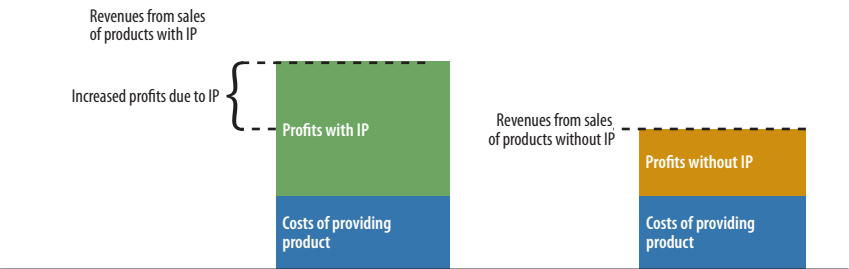
4.2.2.1. Revenues to IP owner from direct use of the IP asset

Revenue may be earned by the IP owner directly from the sale of products and services to the end-market.¹² In this case, the pure revenue contributed by the IP will be from incre-

¹² Revenues may also come from the "non-use" of the IP asset. The IP owner could gain market advantages by preventing or restricting competitors from using the IP. This is only possible if the IP asset is protected by an IP right such as a patent. In this case the quantification of these market advantages is necessary for the "NPV of cash flows" method to be used.

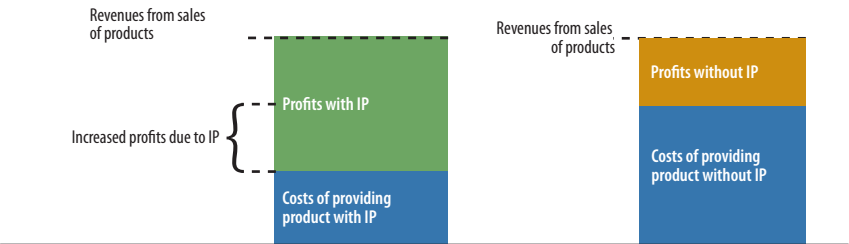
mental profits generated by incorporating the IP into the product or service (profit equals revenues minus costs). This incremental profit may be from additional revenues earned as a result of a “price premium” (see diagram 4.). For example, differentiation from other products or processes on the market through better performance or usability will allow a product with the IP to command a higher sales price. This will create higher revenues (while keeping costs of providing the product the same).

Diagram 4: The increase in profits due to a price premium and increased revenues



Alternatively, a “cost saving” may incur in the manufacture or provision of the product due to the use of the IP (see diagram 5.). For example IP allowing lower manufacturing costs or lower material costs will create cost savings for the provider (while keeping revenues the same).

Diagram 5: The increase in profits due to a cost saving



4.2.2.2. Revenues to IP owner from license fees

If the IP owner allows other parties to use the IP, for example through a license, the revenue from the IP will be in the form of licence payments such as royalties. These licence payments are generally based on the sharing of the incremental profit from the IP asset between the IP owner (licensor) and the licensee.

There are a number of ways to identify and separate the revenues, costs and cash flows to the

IP asset from the overall cash flow stream of the project or business unit (see Box 3). How this is achieved in practice will depend greatly on the commercialisation route of the IP and the availability and accuracy of input data.

4.2.3. The projected costs attributed to the IP asset and their timings

Costs (outgoing cash) attributed to the IP asset will incur at different times, at periods corresponding to the development and commercialisation of the technology. Only costs attributed to the IP asset, considered from the date of the valuation to the end of the RUL should be included.

The costs recognised in the valuation will depend on the commercialisation route chosen for the IP.

Development costs will include all costs incurred during the development of the IP asset, including the costs of developing products, prototyping and trials. Intellectual property protection costs, such as patent renewal fees and the costs of patent attorneys and legal representation are also included.

Commercialisation costs will include all costs incurred in bringing the IP asset to the end-market, including the costs of finding partners, market studies, marketing and promotion of the IP.

If the IP owner commercialises the IP asset directly, by selling products or services incorporating the IP asset, the costs of providing the products or services (manufacturing, sales, administration etc.) may also be included. If the IP owner licences the technology to another party, the costs of providing products and services are included in the cash flow of the licensee. These costs are paid by the licensee and should not appear as costs of the IP asset.

There are a number of ways to identify and separate the costs attributed to the IP asset from the costs of the project or business unit (see Box 3).

Box 3: Separating cash flows attributed to IP

The cash flow of a project is equal to revenues (incoming cash) minus costs (outgoing cash). A number of ways are available to the appraiser to identify and separate cash flow attributed to the IP asset from the cash flow of the "project" or business unit.

For in-depth information about these calculations see publications in the Bibliography.

"Incremental cash flow" calculation

The "incremental cash flow" calculations involve comparing the forecasted cash flow that would be earned by a business unit with and without the use of the IP asset. The difference will be the incremental cash flow attributed to the IP asset.

| | | | | |
|----------------------------|---|------------------------------------|---|---------------------------------------|
| Cash flow attributed to IP | = | Cash flow of business unit with IP | – | Cash flow of business unit without IP |
|----------------------------|---|------------------------------------|---|---------------------------------------|

“Cash flow split” calculation

A “cash flow split” calculation determines the contribution of the IP asset to the forecasted cash flow. A percentage of the cash flow is attributed to the IP asset, while the remainder of the cash flow is attributed to other factors. The percentages used in the calculation depend on how much the IP “drives” the product or service, relative to other factors such as capital, distribution, sales etc. Often rules of thumb of between 10%-50% are used to split the cash flow between the IP and other factors. Alternatively, the historical costs of each factor can be compared and a percentage decided in this way.

In a scenario where the IP is licensed out, the cash flow split analysis is often used together with the incremental cash flow method. This is so that a reasonable split of incremental cash flow between licensor and licensee can be calculated and a reasonable royalty payment analysed. This determination takes into account the licensor’s and licensee’s respective contributions to the development and commercialisation of the IP.

“Relief from royalty” calculation

In a “relief from royalty” calculation it is assumed that the IP is not owned by the project or business unit. The IP belongs to a third party and must be licensed in, involving the payment of royalties. The appraiser calculates the royalty rate that the project or business unit would have to pay to use the IP asset through comparison with accepted royalty rates used in similar sectors. The cash flow attributed to the IP asset in this case would be the revenue earned from the sale of IP based products multiplied by a royalty rate (based on a percentage of revenue).

In practice, data about sector royalty rates is obtained from empirical evidence, industry databases and industry experience.

4.2.4. The discount rate

In income-based methods, the development and commercialisation of an IP asset is considered to be an investment. The discount rate represents the required rate of return that a hypothetical investor would expect to earn by investing in the IP asset.

The discount rate used in the “NPV of cash flows” method takes into consideration the *time value of money* and *risks* related to the cash flows.

Money is worth more today than in the future. The hypothetical investor must be compensated for the time value of the money that they invest. To embody this rate of return, a “risk free” discount rate is used. This rate should correspond to the returns that the investor would receive if they put their money into a risk-free investment.

Risk is defined as the uncertainty associated with realising both the timing and amounts of the expected future benefits.¹³ A risk premium must be included in the rate of return for

¹³ Smith, G. & Parr, R.: Intellectual Property valuation, exploitation and infringement damages, John Wiley & Sons, 2005.

the hypothetical investor. The premium compensates the hypothetical investor for the risks that have an impact on the revenue stream. The higher the risk level associated with an investment, the higher the risk premium and therefore the discount rate.¹⁴

4.2.5. Determination of the discount rate

There is no generally accepted way to determine the discount rate used in income-based IP valuation. All valuations will be different, and appraisers will determine discount rates according to the purpose of the valuation, the available information and their expertise.

Within the "NPV of cash flows method" there are two ways to determine the suitable discount rate:

i. The "build-up" discount rate

Appraisers can apply a discount rate based on the risk-free rate of return and a risk premium so that:

$$\text{Discount rate} = \text{risk-free rate of return} + \text{risk premium(s)}$$

The risk-free rate of return is determined by observing the returns of alternative investments available to a hypothetical investor, such as the interest rates that banks offer for deposits. The rate of return on government treasury bills is often the highest rates of return available without risking capital, and is often used in valuations.

Estimation of the risk premium for use in an IP valuation is highly subjective and there is no broadly accepted approach to elaborate what level of risk corresponds to what risk premium in the discount rate.¹⁵ To build up the discount rate in the "NPV of cash flows" method, the risk premium is determined by observing a general business sector or country risk premium, which is added to or subtracted from depending on the overall market risk, the specific industry risk, and the risks associated with the IP asset (for example development risk, commercialisation risks, risks of regulatory approval, market risks, legal risks, patenting risks). The building up of a suitable rate requires the value to have knowledge and experience in this area.

ii. The business unit discount rate

Alternatively, a discount rate applicable to the business unit or industry sector related to the IP asset can be used as a proxy for the appropriate rate of return.¹⁶ In this case the owner of the IP asset or the business unit owner/operator which will use the IP asset is assumed to have a similar required rate of return.

In the "NPV of cash flows" method, the cost of capital of the business unit can be used as a proxy for the appropriate discount rate.¹⁷ The commonly used model is the capital asset pricing model (CAPM). The CAPM provides the equity cost of capital by starting with a

¹⁴ World Intellectual Property Organisation: IP Panorama, downloaded 2012.

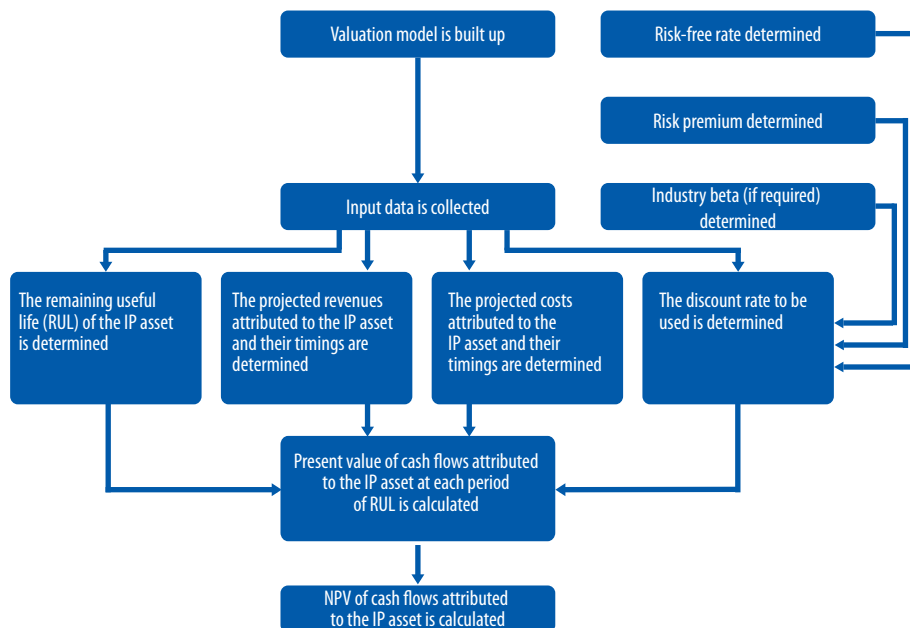
¹⁵ Avance: News in avance, "Discount Rates for Biotech Companies, January 2008, No.1.

¹⁶ Minehart, T.: "Estimating discount rates and capitalization rates" in Insights Special Issue, 2004.

¹⁷ Minehart, T.: "Estimating discount rates and capitalization rates" in Insights Special Issue, 2004.

risk-free rate and adding a risk premium. The risk premium is modified by a beta value. The beta is a broad measure of the amount of risk inherent in a specific investment when compared to the diversified risk of a broad market portfolio.¹⁸ The projected cash flows can be discounted by the rate of return suggested by the CAPM calculation.

4.3. STEP BY STEP GUIDE TO USING THE “NPV OF CASH FLOWS METHOD”



The “NPV of cash flows” method follows these steps:

1. The valuation model is built-up and agreed to by all parties (See 2.5. Building up the valuation model). The model will include determinations of the application(s), end-market(s), commercialisation route and commercialisation timeline of the IP as well as the identification of costs and revenues.
2. The level of complexity for the method is determined according to the purpose of valuation, the availability and accuracy of data and the availability of resources (see 2.3. Complexity level and quality of methods).
3. Input data is collected and values for the following key inputs are determined (see 4.2. Input data required for the “Net present value of cash flows” method):
 - a. the remaining useful life (RUL) of the IP asset,
 - b. the projected revenues attributed to the IP asset and their timings,

¹⁸ Smith, G. & Parr, R.: Intellectual Property valuation, exploitation and infringement damages, John Wiley & Sons, 2005.

- c. the projected costs attributed to the IP asset and their timings,
- d. the discount rate to be used.
4. The present values of cash flows attributed to the IP asset are calculated by:
 - a. calculating the projected cash flow from the IP asset (revenues – costs) for each period along the timeline (usually calculated on an annual basis),
 - b. discounting each projected cash flow using the discount rate, resulting in a present value for each period (see formula in Box 4),

Box 4: Formula for calculating present value at a period t

$$\text{Present value at period } t = \frac{C_t}{(1+i)^t}$$

t is the period

i is the discount rate for the period

C_t is the cash flow during the period

- c. summing all the projected discounted cash flows to determine the NPV (see formula in Box 5).

Box 5: Formula for calculating NPV

$$\text{NPV} = \frac{C_1}{(1+i)^1} + \frac{C_2}{(1+i)^2} + \frac{C_3}{(1+i)^3} + \dots$$

i is the discount rate

C₁ is the cash flow during period 1

C₂ is the cash flow during period 2

C₃ is the cash flow during period 3

4.4. RESULTS OF THE "NPV OF CASH FLOWS" METHOD

The results of the "NPV of cash flows" method are:

- periodic cash flow projections,
- periodic present value of cash flow projections,
- net present value (NPV) of the IP asset.

Box 6: Example of a valuation using the “NPV of cash flows” method

| Remaining useful life – RUL (years) | 6 years (including present year) |
|-------------------------------------|--|
| Revenues attributed to IP asset (€) | €100,000 in year 3, €200,000 in years 4 and 5, €100,000 in year 6. |
| Costs attributed to IP asset (€) | €110,000 in years 1 and 2, €10,000 in years 3–6. |
| Discount rate - i (%) | 20% (determined using the build-up method) |

| Year | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 |
|---------------------------------|--------------------|--------------------|------------------|-------------------|-------------------|------------------|
| Time period | 0 | 1 | 2 | 3 | 4 | 5 |
| Revenues attributed to IP asset | | | 100 | 200 | 200 | 100 |
| Costs attributed to IP asset | 110 | 110 | 10 | 10 | 10 | 10 |
| Cash flow | -110 | -110 | 90 | 190 | 190 | 90 |
| Discounting formula | $-110 / (1+0,2)^0$ | $-110 / (1+0,2)^1$ | $90 / (1+0,2)^2$ | $190 / (1+0,2)^3$ | $190 / (1+0,2)^4$ | $90 / (1+0,2)^5$ |
| Present value of net cash flow | -110,00 | -91,67 | 62,50 | 109,95 | 91,63 | 36,17 |
| Net present value (NPV) | 98,58 | | | | | |

The NPV of the IP asset is €98,580 at a 20% discount rate. This is the present value of all the projected economic benefits of ownership at today's value of money, and accounting for risk.

4.4.1. Periodic cash flow projections

The results of the method include projections of the costs, revenues and the cash flows attributed to the IP asset at each period along its RUL. These values do not take into consideration the time value of money or the riskiness of the cash flows.

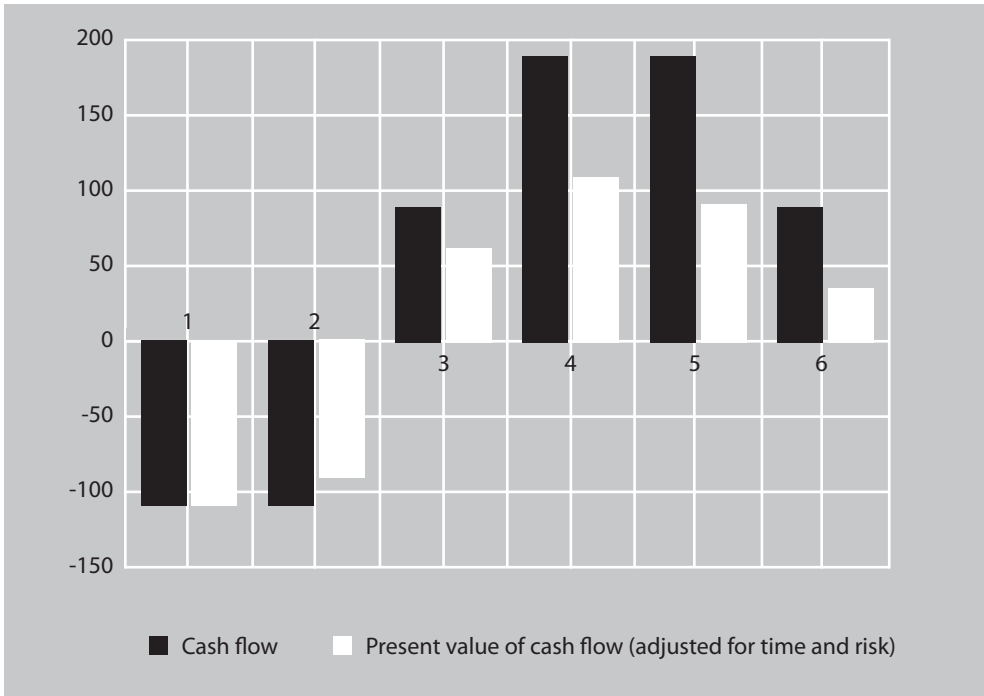
4.4.2. Periodic present value of cash flow projections

This data shows the present value of projected cash flows for each period of the RUL. These values have been discounted by the discount rate and take into consideration the time value of money and the riskiness of the cash flows.

4.4.3. Net present value of the IP asset

The net present value (NPV) of the IP asset is the sum of all the projected discounted cash flows attributed to the IP asset (see formula in Box 5). It is a value in money and is equivalent to the value of the IP asset at the specified discount rate used.

Diagram 6: Periodic cash flow and present value of cash flow projections
(from the valuation of IP asset in Box 7)



4.5. WHEN IS THE "NPV OF CASH FLOWS" METHOD USED?

The net present value "NPV of cash flows" method can be used to provide a quantitative value for individual IP assets or IP "bundles". The method can be used when the purpose of the valuation requires a value in money for the IP asset.

4.5.1. Management of IP assets/decision-making

The results can support management in making resource allocation and investment decisions by providing an understanding of the costs, revenues and levels of risk attributed to commercialisation of the IP asset.

Using the method can assist decision makers with whether to invest into developing and commercialising a technology.

A specific rate of return may be chosen by management which corresponds to the return they require on an investment. The NPV calculation for the IP asset can then be performed with this rate of return as the discount rate. An NPV value of zero or more would support a decision to commercialise the IP asset. An NPV of less than zero would mean that the investment is not worthwhile at that rate of return, and the management should abandon plans to commercialise.

The method can also be used to model various commercialisation routes and plan IP protection strategies in order to select the most optimal one.

4.5.2. Transactions

The results of the method show the present value of future benefits from owning the IP asset. For transactions such as purchases and sales of IP assets, licensing or transfer of use-rights this information is of key importance for all parties in the transaction.

The “NPV of cash flows” method can provide key information to assist with the licensing process by collating revenues, costs and cash flows and aiding the determination of appropriate royalty rates. This information can be used in negotiating and drawing up the terms and conditions of the license contract and to address the specific needs of both parties.

By performing the valuation from the point of view of the “seller” and the “buyer”, it is possible to determine the split of projected benefits between parties and the worthiness of the IP asset as an investment with the different rates of return required by each party.

4.5.3. Company valuation

The results of the method can be used in situations where IP assets are expected to represent a significant value component in a company or where IP assets are responsible for revenue generation. In the case of spin-off companies, IP and other intangible often represents a high percentage of company value.

The results may be useful when a company is subject of an acquisition, merger or in the event of business sale.

4.5.4. Financing and raising capital

Financing is a key issue during the commercialisation of IP. Development and commercialisation often requires investment on a project by project basis from internal sources. Alternatively IP-intensive companies often require external financing to commercialise technology. The “NPV of cash flows” method can provide information to both the recipient and financier about the value of a possible investment.

The results of the method can aid parties when quantifying the equity allocations in the formation of a business or joint venture where one or more parties contribute IP assets.

The method may also be used when a company wishes to raise capital by taking on debt,

using the IP asset as collateral. Although this is relatively uncommon today, the increasing importance of IP assets within company value means that this is an area which is set to grow.

4.5.5. Communication

The results of this method are suited to communicate the significance of the IP asset internally within the owner’s organisation, to external partners or to a specific target audience. For example, the valuation results may be used to highlight the opportunities of the technology in order to gain project funding or as part of a tender. It may also be used as a communication tool and presented to potential licence partners as an independent opinion about the quality of the IP asset.

4.6. COMBINATIONS OF METHODS

The method can be used by itself or to complement the results of other valuation methods (see 2.1. Selecting the appropriate IP valuation methods).

When using IP value in transactions, the result of the “NPV or cash flows” method can be used together with results from market based or cost based methods to determine value from a number of different approaches.

The use of the “NPV of cash flows” method in combination with a qualitative method such as the “Analysis of value drivers” method can greatly enhance a strictly quantitative valuation with insight into the factors that are driving IP value.

The combination of two or more independent IP valuation methods will always give more accurate results, maximising the input data available.

4.7. LEVELS OF COMPLEXITY

The identification and separation of cash flows attributed to the IP asset is the most difficult part of this method. This often requires the appraiser to have knowledge of company finance, licensing and technology transfer. The input data for the method may require information not in the public domain and may require the cooperation of outside experts from industry.

The method is most useful when it is used by an independent appraiser, using a working group to provide input data. This will require considerable resources but will give a high quality of results.

By increased the level of complexity there are possibilities to further increase the quality and accuracy of the results. The NPV calculation can be performed a number of times using different input data to give an IP asset value under different conditions. Using such a scenario analysis, the different input parameters for revenue and cost can be adjusted under a number of “best-case” or “worst-case” scenarios. The “NPV of cash flows” method will

provide a value range which shows the value of the IP asset in each scenario. These results are useful to compare IP value in optimistic and pessimistic scenarios.

The level of risk of the cash flow projections can be varied by adjusting the risk premium component of the discount rate. This will result in a number of different end results, or a range of values. These results are useful to compare IP value under different levels of possible risk.

A simplified version of the “NPV of cash flows” method may be used for a quick, low level valuation of an IP asset. The low complexity level version can be performed by an in-house appraiser with knowledge of commercialisation routes and the IP asset. However, the results may not be of sufficient quality to use in licensing negotiations and may significantly overvalue or undervalue the IP asset.

In Brief:

The “NPV of cash flows” method is intended for the valuation of patented and non-patented technologies or IP “bundles”.

The value of an asset is directly related to the economic benefits it will generate for its owner, throughout the useful life of the asset.

The “NPV of cash flows” method requires the appraiser to estimate the remaining useful life of the IP asset, the projected revenues attributed to the IP asset and their timing, the projected costs attributed to the IP asset and their timing, and the discount rate to be used.

The results of the “NPV of cash flows” method are periodic cash flow projections, periodic present value of cash flow projections, and a net present value (NPV) of the IP asset.

The results of the method can be used for management of IP assets, decision-making, supporting transactions related to the IP asset, company valuation, financing and raising capital and communication.

The “NPV of cash flows” method can be used in combination with other IP valuation approaches to provide a more robust valuation. Particularly useful for commercialisation purposes is the combination of the “NPV of cash flows” method with a qualitative valuation method to give a complete picture of the IP asset’s status.

5. IP valuation case study: microscope measuring system and its application

5.1. BACKGROUND

The Hungarian Intellectual Property Office (HIPO) conducted the valuation of the “microscope measuring system and its application” technology in 2009 as part of the IP valuation pilot project.

5.2. LIMITATIONS OF THE CASE STUDY

This case-study is intended to illustrate the use of IP valuation methods used at the HIPO. The study provides an outline of an IP valuation process but is not intended to serve as a step-by-step guide. Further details about the IP valuation methods used and IP valuation in general are available from the HIPO.

Results published in this case study are taken from the full valuation report but some details have been omitted or simplified in order to maintain confidentiality. Further information about the technology valued is available from Femtonics Kft.

5.3. SELECTING THE MOST SUITABLE IP VALUATION METHODS

5.3.1. Valuation date

The date of the IP valuation was 1st February 2009. The results of the valuation take into account the circumstances of the technology on this date. Any changes in the technology or its environment since that date are not considered in the valuation.

5.3.2. Definition of IP assets, IP rights and associated intangibles

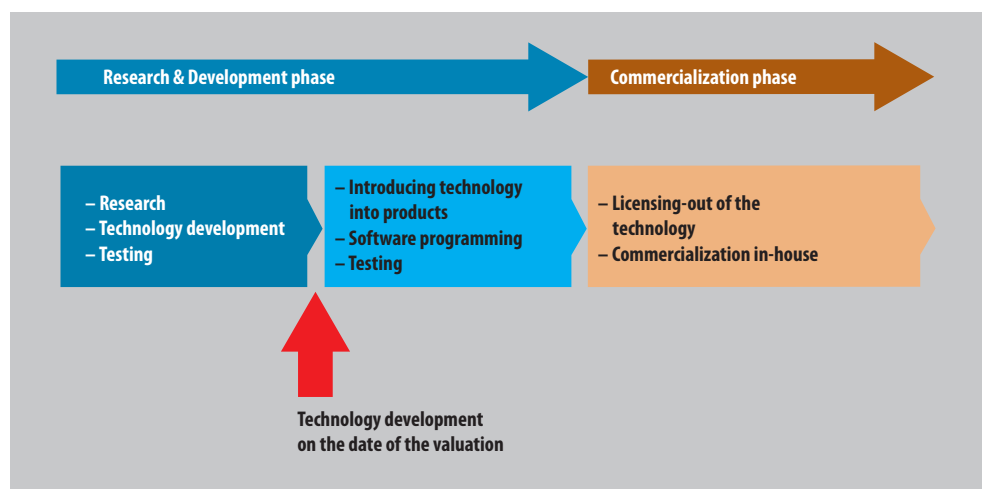
The IP assets valued were a bundle comprising of a core technology, a high-speed microscope solution, associated know-how and controlling software developed for use with the technology.

The technology was developed by researchers at Femtonics Kft.¹⁹ in collaboration with the Institute of Experimental Medicine (IEM),²⁰ a research centre of the Hungarian Academy of Sciences.

As of the valuation date, patent applications with claims covering the core technology had been made in a number of jurisdictions. Know-how had been documented and an embargo on all information about the technology was in place at the IEM and Femtonics Kft. The software was under copyright protection.

At the time of the valuation the technology was already fully developed and demonstrated with operational prototypes, but was not integrated into any products (see Diagram 7 below). The technology under valuation was to be embodied within a physical product, a microscope instrument.

Diagram 7: Status of the Microscope measuring system technology



For the valuation, the technology was defined by the patent applications claims. Associated know-how related to the patent and the controlling software used with the microscope solution were also defined and included in the valuation.

5.3.3. Purpose of valuation

The client, as the IP owner, presented the HIPO with a specific set of needs.

¹⁹ Femtonics Kft. website: <http://www.femtonics.eu/>

²⁰ Institute of Experimental Medicine website: <http://www.koki.hu>

5.3.3.1. Decision-making (internal management decisions)

Firstly, the value of the technology was required to assist with specific internal management decisions. The client had a number of projects under development and the value of this technology was important to make decisions about resource allocation for projects in their portfolio. Specifically, information was required to support the decision to further invest into developing the technology into a viable product, including building product prototypes and testing. The client required information about the uncertainties and opportunities related to the IP, as well as monetary values to support their decisions.

5.3.3.2. Licensing of IP asset

Secondly, the client planned to license-out the technology to a commercialisation partner, potentially an equipment manufacturer with the capacity to manufacture and sell equipment based on the technology. For this transaction the client required information related to the market value of the technology, cost and revenue estimations and a monetary value to use in license negotiations. The results were required as a benchmark value for use in future negotiations.

5.3.3.3. Communication

Thirdly, the client required an independent opinion about the value of the technology in order to communicate the significance of the IP asset a) internally within its organisation and b) to potential partners, licensees.

5.3.3.4. Value creation

Finally, the client was interested in adding value to the IP asset, increasing the value of the technology before negotiating with potential licensees and business partners. The adding of value to the asset would involve decreasing uncertainty related to commercialisation.

5.3.4. The client (beneficiary of valuation)

The client for the valuation was Femtonics Kft. It is significant to note that the client is the same as the owner. The valuation was conducted from the point of view of Femtonics Kft., as the licensor of the core technology, know-how and software.

5.3.5. The appraiser

The valuation of the technology was conducted by the HIPO. The appraiser was independent and in no way associated with the IP owner or the client.

5.3.6. Definition of target audience for the valuation

Information gained from the valuation was to be used by and communicated to a) the management of the research institute and Femtonics Kft., and b) potential licence partners. The target audience was assumed to have good technical knowledge and experience within the scientific field and the relevant markets.

5.3.7. The availability and accuracy of information used in the valuation

The valuation was conducted using a number of information sources and with the assistance of a number of professionals as part of a working group. The following experts provided information for the valuation:

- R&D team leader,
- expert in the field of the technology / industrial property,
- independent market expert from industry (optical instruments sales),
- legal / industrial property expert.

The client was the same entity as the IP owner and therefore the valuation team had access to full technical data and information about the technology. An independent market expert from industry (optical instruments) provided sales information, projections, market data and technical data. Industrial property data and information was provided by the HIPO patent examiner expert in the field. Legal and industrial property information was provided by a HIPO legal expert.

All the participants were selected because of their expertise in their relevant areas. The information requirements for the valuation were met entirely by the experts in the working group.

5.3.8. Resources available for the valuation (human and financial resources, time)

Human resources were provided by the HIPO, the client and an external expert. Financial resources for the valuation were provided by the HIPO, as part of the IP valuation Pilot Project. The time allocated to the valuation was 3 months.

5.4. BUILDING UP THE VALUATION MODEL

5.4.1. Definition of application(s) and end-market(s)

The technology was developed to be incorporated into microscope products and microscope components. Potential products using the technology were custom built laser scanning microscopes with supporting software and add on components to enhance existing microscope systems.

These products and components could be utilised in a number of fields including brain

research and pharmaceutical development. The end-markets for products using the technology were identified as neuroscience research, pharmaceutical research and other basic research where biological samples are examined. Microscopes using the technology were identified to be especially suited for examining neural networks and examining live brain tissue. The customers buying the end-products would be mainly research institutes and companies engaged in research activity.

The end-market was considered to be world-wide. No other applications for the technology were considered.

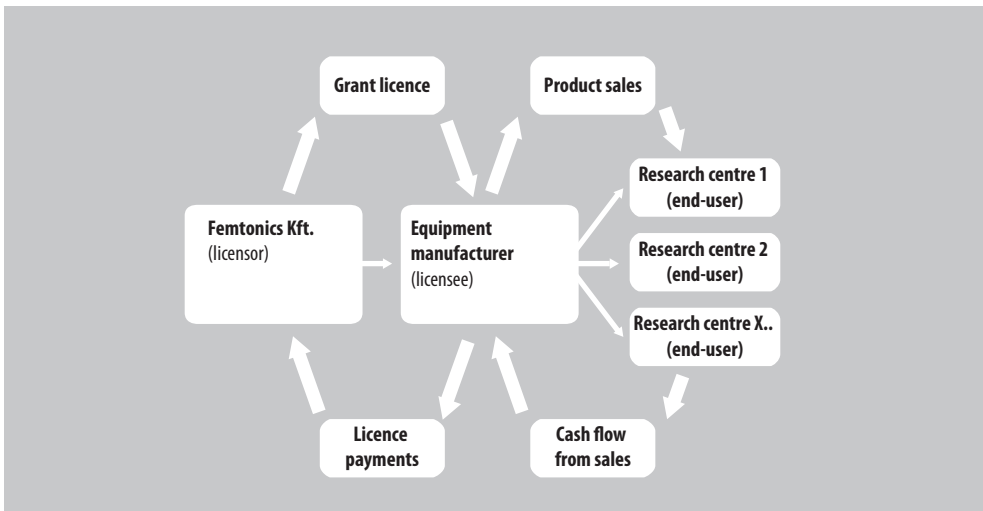
5.4.2. Definition of commercialisation route

At the time of the valuation, the technology was not licensed, commercialised or otherwise exploited.

The commercialisation route used in the model was to license the technology and software and allow the licensee to sell products using the technology as a complete solution (microscope, software and after-sales support). The following route for commercialisation was determined (see Diagram 8):

1. The owner (Femtonics Kft.) would licence out the technology and software on an exclusive basis to one commercialisation partner, and as yet unspecified original equipment manufacturer. The partner would finalise the development of the technology as a complete solution (microscope, software and after-sales support).
2. The licensee would sell the complete solution as a microscope product or a microscope component to be added to an existing microscope. According to the model the licensee would pay a royalty based on revenues from the products to the licensor (Femtonics Kft.).

Diagram 8: Diagram of commercialisation route for microscope technology



The valuation was conducted from the point of view of Femtonics Kft., as the licensor of the core technology and the owner of know-how and software.

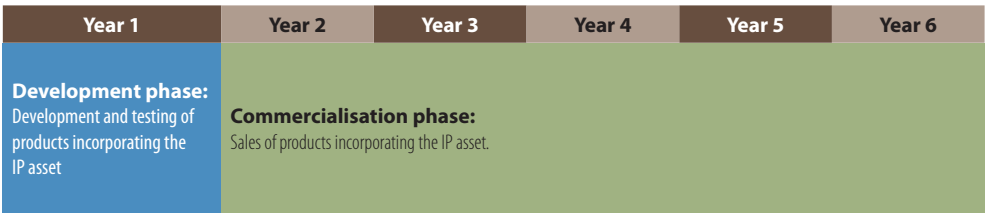
5.4.3. Definition of IP asset development and commercialisation timeline

The valuation model considers the first 6 years of the technology lifecycle as the technology’s remaining useful life (RUL). This is the time on the market determined by the working group before competitive developments are likely to make the technology obsolete. The RUL took into consideration the pace of new technology development in the industrial sector, expected trends and research in the pipeline.

During the development stage of the technology (Year 1) Femtonics Kft. intended to develop the technology to a stage where it can be licensed out. Work planned included building a prototype to show prospective licensee partners, incorporating the technology into test products, software programming etc. The development stage would also include locating partners and potential licensees, attending trade events, deal-making, presentations etc.

Once the technology has been licensed and is being commercialised by the licensee, it is expected to have a market life span of 5 years (commercialisation stage: years 2-6). After this time the technology is likely to be superseded and no longer used.

Diagram 9: Timeline of technology development and commercialisation



5.5. VALUATION METHODS USED AND LEVEL OF COMPLEXITY

The circumstances of the IP asset being valued determined the most appropriate combination of methods used. To give the most robust results, two valuation methods were selected from the toolbox and used in combination:

- “Analysis of value drivers” method (qualitative method based on analysis and rating of different factors related to the IP),
- “NPV of cash flows” method (income-based quantitative method.)

For a detailed description of these methods see chapters 3 and 4.

To give the most accurate results possible with the resources available (human, time, financial) the methods were performed at a medium level of complexity (see 2.1. Selecting the

appropriate valuation methods). This involved using high quality input information from the R&D team and a working group with expertise in the areas required for the valuation.

This complexity level was necessary to provide results of a quality which would fulfil the purpose of the valuation. The model used adequately illustrated the commercialisation route, without overloading the message of the valuation with finance theory.

5.6. RESULTS OF THE “ANALYSIS OF VALUE DRIVERS” METHOD

The “Analysis of value drivers” method was chosen as it provides a thorough analysis of the present state of the technology, including detailed descriptions of uncertainties related to commercialisation.

The results of the method were:

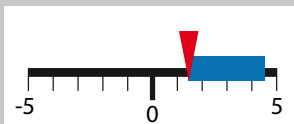
- a *factor-by-factor analysis* of all the value driving factors related to the technology,
- an *uncertainty-opportunity “matrix”* graphically compiling all the value driving factors related to the technology,
- an *uncertainty-opportunity “profile”* of the technology.

5.6.1. Factor-by-factor analysis

Specific factors in the following 5 categories were identified as value drivers:

- TECHNOLOGY and DEVELOPMENT factors (10 factors),
- IP PROTECTION and IP ENFORCEMENT factors and LEGAL factors (13 factors),
- MANAGEMENT and HUMAN RESOURCES factors (11 factors),
- FINANCING factors (4 factors),
- END-MARKET factors (10 factors).

Each of the 48 value driving factors were analysed and scored individually. The analysis produced objective results (e.g. the present status of factor) and subjective results (e.g. uncertainties and opportunities related to factor) and an opportunity / uncertainty score related to the factor on a linear scale between -5 and +5 (see Box 7). For example of a factor analysis see Diagram 10 and Diagram 11.

Box 7: Explanation of the scoring system

Each factor related to the technology is given an uncertainty / opportunity score (on a linear scale between -5 and +5). The best possible scenario relating to the factor would receive a score of +5, while the worst-case scenario would receive a score of -5. The subjective status of the factor will be represented by a score between these two extremes.

A score near zero shows that the situation of the factor is neutral. This situation does not represent an uncertainty or an opportunity. The situation is under control and well managed.

A score below zero shows that there is an uncertainty related to the factor. This uncertainty can have a negative effect on commercialisation and can decrease the value of the technology. Factors with a score below -1 deserve immediate attention and should be managed.

A score above zero shows that there is an opportunity related to the factor. The opportunity can have a positive effect on commercialisation and can increase the value of the technology.

The further away from the neutral line that the score is located the greater the uncertainty or the opportunity.

A post-valuation change in the situation of the technology can move the uncertainty factors towards zero and eventually make them into opportunities.

If more than one expert is asked to provide input data about the IP (for example if a working group is used) the blue bar will represent the range of expert opinion. In the example above, the score given by one expert is 1.5, while another gave a score of 4.5. The length of the blue bar shows the range of opinion.

The red triangle represents the opinion of the expert with the most expertise in the category of the factor. For example, an industry expert may have more knowledge about market-orientated factors than the R&D team leader. The red triangle therefore shows the most likely status of the factor, according to the working group member most knowledgeable in the field.

DIAGRAM 10: Example of a TECHNOLOGY / DEVELOPMENT factor analysed²¹**B5 | Development time required before exploitation and commercialisation***How much time is required before the technology can be commercialised within a product?*

The chosen commercialisation route is the licensing out of the technology. This allows a partner organisation to commercialise the technology as part of a product.

Uncertainty: There is no complete prototype product to view or test, and this process could pose numerous technical and standardisation problems. Configuration, calibration, packaging will be necessary before product can be showcased.

Opportunity: The facilities, know-how, equipment are all in place. According to the owners, one year is needed to bring the technology to a product prototype level.

DIAGRAM 11: Example of an IP PROTECTION/IP ENFORCEMENT factor analysed²²**A7 | Disputes and legal proceedings in the operative markets***Are disputes and legal proceedings customary in the operative markets? Do these disputes represent a significant burden on the resources (time, money) of the owners?*

The solution onto which the technology is built is patented in Europe and Japan (the 2PE patent). A similar United States patent expired in November 2009. The remaining patents will expire in 2010. The 2PE patent has been attacked many times and there have been legal proceedings in the operative markets.

The technology owners do not have permission to use the 2PE patent and have been prevented from selling the technology outside Hungary as a result. The competitors who have licenses to the 2PE patent have signalled that legal proceedings will be started if the technology owners attempt to enter markets where patent protection is in place.

Uncertainty: The competitors in the microscope market have proven that they are willing to go to court to assert patent rights. A potential infringement case could lead to undesirable expenses for the technology owner during commercialisation.

Opportunity: The larger market competitors do not have a high-speed solution similar to the technology. However, they are willing and able to assert their rights related to the 2PE market. This means that the market is worth protecting and is significant.

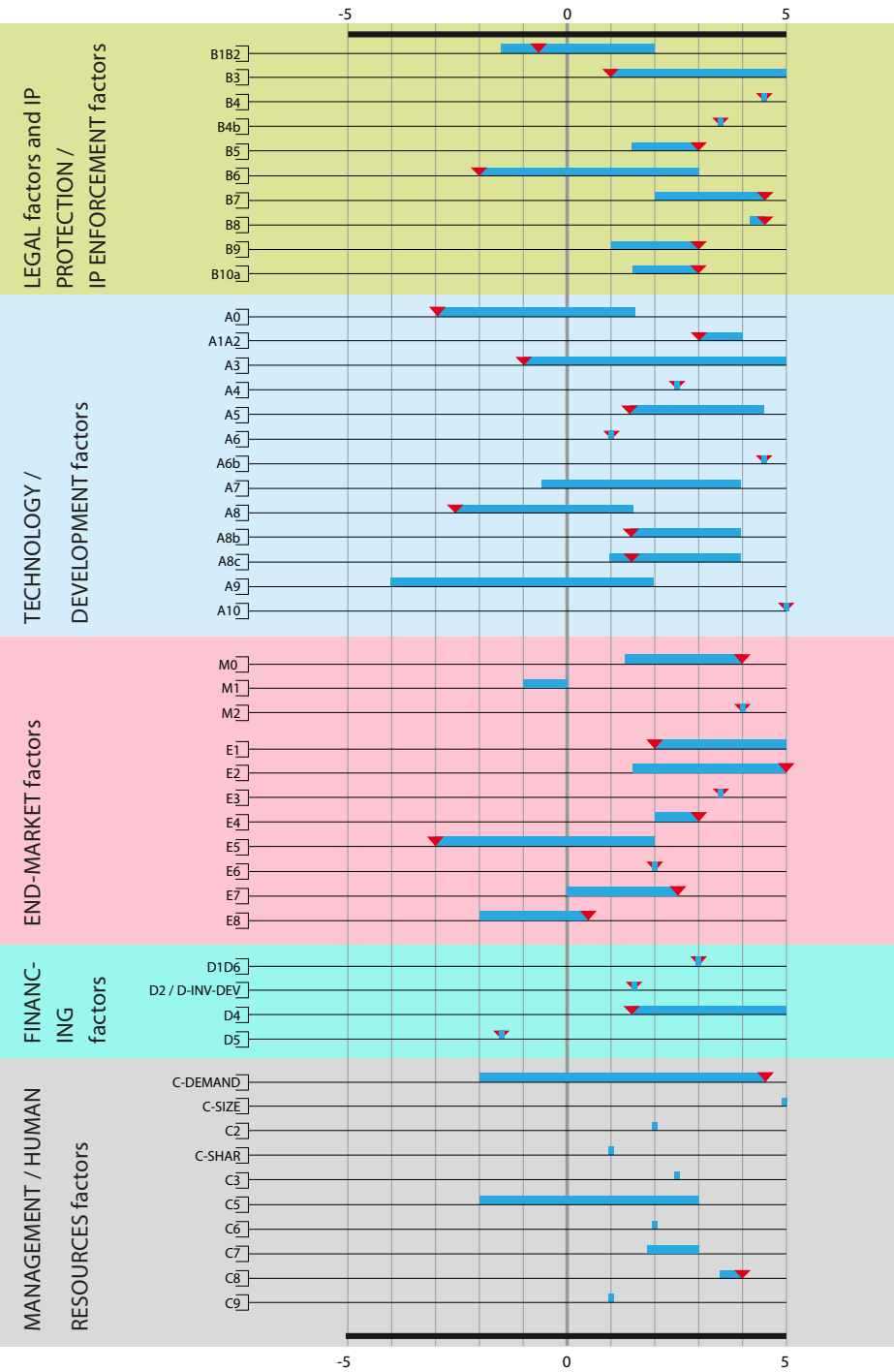
Opportunity: The relevant 2PE patents will expire soon, and will no longer hinder commercialisation of the technology.

Opportunity: The 2PE technology has been actively copied in the past, and so represents a value to companies willing to infringe the 2PE patent.

²¹ This value driving factor was adapted from the IP Score software.

²² This value driving factor was adapted from the IP Score software.

Diagram 12: Uncertainty – opportunity matrix of “microscope measuring system” technology



5.6.2. Uncertainty-opportunity matrix

The matrix compiles the opportunity / uncertainty scores (on a linear scale between -5 and +5) of all the factors, graphically on a single diagram (see Box 7 for explanation of the scoring system). It is intended to provide a visual representation of the results and give a detailed picture of the commercialisation environment that the IP owner is likely to face during development and commercialisation.

The uncertainty-opportunity matrix of the technology is displayed according to the ratings for each factor²³ (see Diagram 12 below).

5.6.3. Uncertainty-opportunity profile

An *uncertainty-opportunity “profile”* was built up for the IP asset. The profile of the technology is a compilation of the most prominent uncertainties and opportunities related to each category of factors, with relevant analysis.

For easy reference, the profile was limited to two pages of the valuation results report. The results gave a detailed picture of the environment that the owner was likely to face during commercialisation. Examples of the results gained from the analyses are summarised below.

5.6.3.1. TECHNOLOGY and DEVELOPMENT factors

These value driving factors relate to the quality of the technology itself. Factors analysed and scored include the complexity of the technology, dependence on other technologies, availability of complementary assets, stage of development, uniqueness and a comparison to other available technologies.

Overall, the status of the 10 factors related to the technology itself showed a number of key opportunities. Only two factors were rated as uncertain by some members of the working group, although many of the factors showed a range of opinion.

| Opportunities | Uncertainties |
|---|--|
| <ul style="list-style-type: none"> ▪ The analysis identified the specific feature where the technology is unique compared to other available technologies. This feature proved to be sufficiently advanced in its field to represent a clear opportunity for the technology. ▪ The state of development of the technology was sufficiently advanced to drive the value of the technology in a positive direction. | <ul style="list-style-type: none"> ▪ The absence of complete product to view or test could limit the commercialisation potential. |

²³ NOTE: The valuation took place in 2009. This information is now out-dated.

5.6.3.2. IP PROTECTION and IP ENFORCEMENT factors, LEGAL factors

Factors in this category relate to how the technology is protected by IP rights, as well as non-IP rights related protection strategies. The possibilities for the enforcement of any IP rights and the ability of the owners to maintain and enforce IP rights are also analysed and scored. Factors include the status and scope of IP protection, the “copyability” of products or processes incorporating the IP asset, and the possibilities for identifying infringement. Legal factors analyse the quality of the relationship between the owner and any commercialising partners.

The range of opinion (shown by the length of the bars) is relatively large, signifying that the experts had different views about specific issues. The lead expert’s opinion (shown by the red triangle) is generally on the cautious side of the respondents range, signifying that the respondents could be overly optimistic.

| Opportunities | Uncertainties |
|---|--|
| <ul style="list-style-type: none">▪ A number of key opportunities related to this category were identified including the strength of the patent claims, the extent and status of patent protection and the remaining time of protection.▪ A commercialisation partner may wish to use the patent to block competitors from commercialising similar technology and ensure “freedom to operate” in the market. | <ul style="list-style-type: none">▪ Key uncertainties included the complexity of the technology, the ease with which the technology can be copied by professionals in the field, as well as the difficulty of identifying infringing products in the market. |

5.6.3.3. MANAGEMENT and HUMAN RESOURCES factors

This category of factors analyses specific aspects related to the commercialisation strategy for the technology, the management of the technology and the competences of the owner to commercialise the technology. Factors analysed and scored include the technology owner’s management experience, knowledge of application potential for the technology, networks, and the support of research and development staff in the commercialisation process.

Most of the value drivers were analysed to be opportunities. The range of opinion (shown by the length of the bars) is relatively large, signifying that the experts had different views about specific issues.

| Opportunities | Uncertainties |
|--|--|
| <ul style="list-style-type: none"> ▪ The management team had the skills needed for successful commercialisation of the technology. The CEO could utilize good networks and represents the IP owner in the commercialisation of the IP. The scientists developing the IP were well-known scientific figures in Hungary, and internationally acclaimed in their respective fields. ▪ There are only a few prospective commercialisation partners and they are well known by the technology owners. | <ul style="list-style-type: none"> ▪ The owners required human resources and time to deal with the issue of commercialisation, finding partners and conducting the licensing negotiations. ▪ The IP owner had no staff allocated to the specific issues of commercialisation.. |

5.6.3.4. FINANCING factors

Factors in this category relate to the resources available for the development and commercialisation of the IP. Factors analysed include the ability of the IP owner to cover the costs of commercialisation and prospects for external investment.

| Opportunities | Uncertainties |
|---|---|
| <ul style="list-style-type: none"> ▪ As the technology is licensed to a commercialising partner, costs to the owners would be limited to developing a prototype “product”, preparing the license deal and the upkeep of the patent and related costs. ▪ The owners have the financial means to consult patent attorney, legal counsel and consultants when assistance with IP issues is required. | <ul style="list-style-type: none"> ▪ The administrative costs of finding a commercialising partner and preparing the license deal would be a significant cost to the IP owner. |

5.6.3.5. END-MARKET factors

These factors relate to the conditions of the target end-market for the product or process incorporating the technology. Factors analysed include the number and quality of applications for the technology, potential end-market demand, competition in the market sector and willingness to pay.

Most of the value driving factors analysed were regarded as being an opportunity. Two had

significant ranges of opinion, the remaining factors showed widespread agreement among the members of the working group.

| Opportunities | Uncertainties |
|--|--|
| <ul style="list-style-type: none">▪ The technology, in the form of a high speed module, added to an existing apparatus would generate additional revenue.▪ Opportunities included the fact that the worldwide demand for product with such a capability is clearly defined. | <ul style="list-style-type: none">▪ The demand for the product using the technology is based on its ability to scan at relative high speeds. This must be continuously proven in a market setting. |

5.7. RESULTS OF THE “NPV OF CASH FLOWS” METHOD

The “NPV of cash flows” method was selected as it provides a thorough quantitative assessment of IP value including detailed cost, revenue and cash flow projections.

The method determines the value of an IP asset by calculating the net present value (NPV) of the cash flows that could actually or hypothetically be achieved by a market participant owning the asset²⁴. Cash flow is the difference between revenues (incoming cash) and costs (outgoing cash).

The results of the NPV of cash flows method were:

- periodic cash flow projections,
- periodic present value of cash flow projections,
- net present value (NPV) range of the IP asset.

5.7.1. Input data required for “NPV of cash flows” method

5.7.1.1. The remaining useful life (RUL) of the IP asset

The valuation model considered the first 6 years of the technology lifecycle as the technology’s RUL (see 2.5.3. Definition of IP asset development and commercialisation timeline).

5.7.1.2. The projected revenues (incoming cash) attributed to the IP asset and their timings

The revenues attributed to the IP asset received by the licensee are from sales of microscope products or microscope components. The revenues from the IP asset to the licensor (Femtonics Kft.) are in the form of license fees based on a percentage of the licensee’s revenues.

²⁴ International Valuation Standards Council: International Valuation Standard 210, 2011.

In order to determine the cash flow amounts attributed to the IP, incremental cash flow calculations were performed. These calculations involved comparing the projected periodic cash flows of the licensee with and without the IP asset. The calculations considered only incremental revenues and incremental costs to the licensee from the incorporation of the technology into products. The resulting difference in the cash flows was considered to be the cash flow attributed to the IP asset.

The following input data was determined for each period during the RUL:

- potential size of end-market, market demand for the products, expected market share (units),
- growth in the end-market (%),
- expectations of product price and willingness-to pay for products WITH and WITHOUT the IP (€),
- revenue of licensee from sale of products WITH and WITHOUT the IP (€),
- expectations of costs to the licensee from sale of products WITH and WITHOUT the IP (€),
- expectations of costs to the licensee of further product developments and developing a complete solution using the IP (€),
- cash flow of the licensee from sales of products WITH and WITHOUT the IP (€),
- an acceptable split of the incremental cash flow attributed to the IP between the licensor and the licensee (%),
- an acceptable licence fee construction between the licensee and Femtonics Kft (% or revenue).

The results of the “revenue projection” show the revenue from license fees that Femtonics Kft. would expect to receive from licensing the IP, per period of the RUL.

5.7.1.3. The projected costs attributed to the IP asset and their timing

The development costs attributed to the IP asset paid by the licensor (Femtonics Kft.) included the investment required to develop the technology into a product, prototyping and testing in Year 1. The development project is transferred to the licensee in year 2.

Commercialisation costs related to the IP such as finding partners and licensing expenses were included in the calculations. Intellectual property costs, such as patent renewals and the costs of patent attorneys and legal representation were included. The costs of possible infringement actions in the RUL, whether the owner is the prosecutor or defendant, were not included in the assessment.

Only costs related to this specific technology were included.

The costs attributed to the IP asset paid by the licensee are due to further product developments and developing a complete solution using the IP. These costs were accounted for in the cash flow calculations of the licensee. Cost related to manufacturing of products,

administration, marketing and sales are also accounted for in the cash flow calculations of the licensee.

The result was a “cost projection” showing the projected costs of the technology to licensor, during each period of the RUL.

5.7.1.4. The discount rate

The discount rate used for the valuation took into consideration the time value of money and the risk related to the cash flows (see 4.2.5. Determination of the discount rate).

A business unit discount rate was used as a proxy for the discount rate related to the IP asset. For the determination of this specific rate the cost of capital of the companies in the industry sector was used as a basis and adjusted to the circumstances of the IP being valued.

An appropriate discount rate was determined using the Capital Asset Pricing Method (CAPM) formula. The CAPM calculates the cost of capital of an asset, which is taken to be the discount rate for the valuation.

The risk-free rate required was determined using the yields of long term government bonds having a maturity similar to the time horizon of the projected cash flows for the IP asset. The beta value was determined using the beta value for companies with a precision instruments profile at the time of the valuation. This data was obtained from beta databases. The market risk premium for the CAPM calculation was estimated using a survey of financial literature providing historical ranges.

For more information about the CAPM please see publications in the bibliography.

5.7.2. Results of the “NPV of cash flow” method

5.7.2.1. Periodic cash flow projections

The results of the method included projections of the costs, revenues and the cash flows attributed to the IP asset at periods along its RUL. These values were not discounted at this stage and did not take into consideration the time value of money or the riskiness of the cash flows.

Revenue, cost and cash flow projections were calculated from the point of view of the licensor (Femtonics Kft.).

The revenue projection provided the following results for each period of the RUL:

- incremental revenue to the licensee from sale of products attributed to the IP (€),
- incremental costs to the licensee related to the development and sale of products attributed to the IP (€),
- incremental cash flow attributed to the IP asset (€),
- revenue to the licensor (€).

The cost projection provided the following results for each period of the RUL:

- development costs attributed to the IP asset paid by the licensor (€),
- commercialisation costs attributed to the IP asset paid by the licensor (€),
- intellectual property costs attributed to the IP asset paid by the licensor (€).

5.7.2.2. Periodic present value of cash flow projections

This results showed the value in Euros (at the valuation date's Euro value) of each periodical cash flow attributed to the IP. These values were the result of discounting the periodic cash flows using the discount rate. The results were summarised in tables and charts.

5.7.2.3. Net present value (NPV) of the IP asset

This value is the sum of the projected cash flows from the date of the valuation to the end of the RUL. The NPV value is considered to be the value of the IP asset, in Euros, at a specific required rate of return (the discount rate).

The internal rate of return the “project” of developing and commercialising the IP asset was also determined. This is the discount rate or rate of return for the IP asset given by the NPV calculation when the NPV is equal to zero.

5.8. THE RESULTS OF THE IP VALUATION

The results of the “Analysis of value drivers” and the “NPV of cash flows” methods were used in combination to fulfil the purposes of the valuation (see 2.4.3. Purpose of the valuation).

5.8.1. How did the results of the IP valuation fulfil the purpose of the valuation?

The client, as the IP owner, presented the HIPO with a specific set of needs related to decision-making (internal management decisions), licensing of IP asset, communication and value creation.

5.8.1.1. Decision-making (internal management decisions)

Value information about the technology was required to assist with specific internal management decisions. Using the combined results of the qualitative and quantitative methods enabled the client to:

- compare specific factors related to the technology bundle with other technologies in its portfolio (factor-by-factor comparison),
- support the decision to further invest into developing the technology into a viable product, including building product prototypes and testing,

- use the NPV calculation to decide if a given cost of capital will bring a positive return on investment,
- use the NPV calculation to determine the internal rate of return for the project and make a decision about whether this was sufficient, and
- make a decision about whether or not pursuing a licensing strategy is the most efficient way to commercialise the technology,
- address the uncertainties related to the technology and the commercialisation environment which may hinder the commercialisation of the technology.

5.8.1.2. Licensing/sale of IP asset

The working group built up a viable commercialisation scenario for the technology involving the licensing-out of the technology to an licensee partner. The combined results of the qualitative and quantitative methods enabled the client to:

- establish cost and revenue estimations related to the technology,
- estimate the value of using the technology (for the licensee),
- estimate the willingness-to-pay of the licensee for the technology,
- estimate benchmark values for use in licence negotiations,
- highlight a number of uncertainties related to the technology, which could have been potential hurdles during license negotiations,
- neutralise a number of key uncertainties related to the technology, and
- make a decision about whether licensing the technology would be financially worthwhile.

5.8.1.3. Communication

The results of the methods and the commercialisation model built up by the working group were used to communicate information about the technology and its potential:

- internally within the owner's organisation and associated academic and industry networks,
- to potential commercialisation partners, investors and licensees.

Information and data which could be communicated included:

- a viable commercialisation scenario for the technology,
- projected costs of commercialisation for the licensor,
- projected revenue from commercialisation for the licensor,
- uncertainties related to the technology and its commercialisation, and
- opportunities related to the technology and its commercialisation.

5.8.1.4. Value creation

The results of the methods highlighted areas where value can be added to the technology by:

- changing specific circumstances surrounding the technology where there are uncertainties in order to neutralise these uncertainties,
- strengthening those specific areas where there are already opportunities related to the technology,
- making decisions which create the optimal circumstances for commercialising the technology, and
- increasing the revenue for the IP owner though capturing more value in negotiations with commercialisation partners.

IN BRIEF: the IP valuation case study

The HIPO conducted the valuation of the microscope measuring system and its application technology in 2009 as part of the IP valuation pilot project.

The IP assets valued were a bundle comprising of a core technology, a high-speed microscope solution, associated know-how and controlling software developed for use with the technology. The technology was developed to be incorporated into microscope products and microscope components. Potential products using the technology were custom built laser scanning microscopes with supporting software and “high-speed” add-ons to enhance existing microscope systems.

The route for commercialisation was determined and the development and commercialisation timeline for the technology was established.

The circumstances of the IP asset being valued determined the most appropriate combination of methods used. To give the most robust results, versions of the “Analysis of value drivers” and the “NPV of cash flows” methods were used in combination. The valuation was conducted with the assistance of a number of professionals as part of a working group.

The “Analysis of value drivers” method is a qualitative valuation approach intended to give a deeper insight into many of the independent and interdependent factors which may affect the value of a technology. The tool is based on the analysis and rating of the IP asset itself, the quality of the research and development environments, the quality of the commercialisation environments, the quality of protection (IP rights and other forms) for the IP asset and the end-market for the product incorporating the IP asset. The results of the method were a factor-by-factor analysis of all the value driving factors related to the technology, a uncertainty-opportunity “profile” and an uncertainty-opportunity “matrix”.

The “Net present value of cash flows” method is a quantitative valuation approach that determines the value of an IP asset by calculating the net present value (NPV)

of the cash flows that could actually or hypothetically be achieved by a market participant owning the asset. In order to arrive at a value, the method considers the remaining useful life (RUL) of the IP asset, the revenues attributed to the IP asset, the costs attributed to the IP asset, the cash flow generated by the IP asset at each period of its remaining useful life and the risks related to the cash flows generated by the IP asset.

The results of the NPV of cash flows method were periodic cash flow projections of the IP owner, periodic present value of cash flow projections, and net present value range of the IP asset.

The results of the “Analysis of value drivers” and the “NPV of cash flows” methods were used in combination to fulfil the purposes of the valuation. The client, as the IP owner, could use results of the two methods to assist with internal management decisions, in the process of finding license partners and licensing the IP, communicating the significance of the IP asset and adding value to the IP asset.

6. IP valuation issues and practical conclusions

6.1. PRACTICAL IP VALUATION ISSUES AND OBSTACLES

The practical aspects of completing an IP valuation assignment often bring about unanticipated issues and obstacles. Throughout the valuations performed within the IP valuation pilot project there were a number of key issues which needed to be addressed. In our experience, we have found that the same issues appear again and again. The main issues and observations are elaborated below.

6.2. THE AVAILABILITY AND ACCURACY OF INPUT DATA

The “Analysis of value drivers” and the “NPV of cash flows” methods require substantial input data about the IP asset and its development and commercialisation environments. The availability and accuracy of input data for the valuation is a key issue.

IP value is based on assumptions about the projected use of the IP asset, what important milestones will be met and strategic decisions taken. Most valuation exercises are thus based on envisioning the projected use of an IP asset, relying almost entirely on educated predictions. The input data required is often subjective. To ensure the accuracy of this data, the sources must be of the highest standard available.

For the “NPV of cash flows” method, quantitative end-market data is required, as well as quantitative sectoral data related to the industry sector where the IP asset will be used. There is also a requirement to determine the correct amount of risk present in the commercialisation of the IP asset. Overestimating the risks will undervalue the IP asset, while neglecting key risk areas will overvalue it. An appraiser will need to identify, obtain and correctly use risk information.

6.2.1. Possible solutions

6.2.1.1. Setting up a working group to value IP assets

The valuation requires input data in a number of different professional areas. To provide accurate input data the support of a working group is highly recommended. The working group should comprise of members of the technology development team, an expert in the field of the technology / industrial property, a legal expert and a market expert with industry knowledge relevant to the end-market. The participants of the working group should be selected because of their knowledge in the relevant area. In this way, the data requirements for the valuation can be met entirely by the experts in the working group.

However, in our experience finding suitable experts for the working group is a difficult and time consuming task. This is a key issue in any valuation.

6.2.1.2. Using simplified, lower complexity methods

If the accuracy and availability of information limit the valuation, less complex versions of the methods may be used. Data may be obtained from the IP owner, or client, even if they are not an expert in the area of enquiry. If no data is available from any source, it is possible to extrapolate data or create assumptions in the valuation.

In our experience simplified versions of the “Analysis of value drivers” and “NPV of cash flows” are useful tools, but simplification of methods can often produce results which are of low quality.

6.3. RESOURCES AVAILABLE FOR THE VALUATION (HUMAN AND FINANCIAL RESOURCES, TIME)

The resources needed for a full in-depth valuation include the time and expense of the appraiser and (possibly external) individuals in the working group (e.g. technology professional, IP professional, legal professional, market professional from the relevant end-market sector).

The use of a valuation professional with experience in the valuation of IP assets together with a working group comprising of experts qualified to provide data will always generate the best quality results. But often, time and finance constraints do not allow these experts to be used for the valuation.

6.3.1. Possible solutions

6.3.1.1. Using simplified, lower complexity methods

These less complex methods require fewer resources and are useful when the IP owner is the only source of data. In this case, the results will be of a lower quality, but can be suitable for an initial estimation of IP value or for specific purposes.

It is important that the methods chosen for the IP valuation conform to the aspects considered when selecting IP valuation methods, especially the purpose of the valuation (see 2.4. Aspects considered when selecting IP valuation methods and levels of complexity). For example, conducting a simplified valuation using the “NPV of cash flows” method, without accurate market data will produce results which are biased and incorrect.

6.4. THE APPRAISER

The “Analysis of value drivers” and the “NPV of cash flows” methods were developed primarily for use by an appraiser with knowledge of IP valuation and technology transfer processes. The expertise of the appraiser related to a) valuation methodologies used and b) the area of the subject IP asset will have a significant impact on the valuation.

6.4.1. Possible solutions

6.4.1.1. Using simplified, lower complexity methods

The use of a dedicated appraiser is too time consuming and expensive for some valuation purposes and target groups. There is significant demand for tools where the IP valuation can be performed in-house by the owner of the IP asset.

Lower complexity versions of the methods can be effectively used in-house by the IP owner, without the need for an external appraiser or external input data. These lower complexity tools can be in the form of software, spreadsheets or an internet interface.

6.5. CONCLUSIONS

This publication aimed to introduce two key valuation methods used at the Hungarian Intellectual Property Office for the valuation of technology based IP assets.

The “Analysis of value drivers” method is a qualitative valuation approach which examines

- the quality of technology itself,
- the quality of related research and development environments,
- the quality of related commercialisation environments,
- the quality of protection (IP rights and other forms) for the IP asset, and
- the end-market for the product or process incorporating the IP asset.

In the method, the value of an IP asset is linked to how the IP asset being valued performs in six key categories. Specific factors within these six categories are individually analysed and scored.

The results of the method are factor-by-factor analyses of all the value driving factors related to the technology, an uncertainty-opportunity “matrix” graphically compiling all the

value driving factors related to the technology and an uncertainty-opportunity “profile” of the technology.

The results of the method can be used for management of IP assets and decision making at various times during the commercialisation process. The method is suited to communicate the significance of the IP asset within the owner’s organisation and to external partners. The results of the valuation may be used to add value to the IP asset through decreasing the uncertainty related to successful commercialisation.

6.5.1. “Net present value of cash flows” method

The “Net present value of cash flows” method is an income-based approach used for calculating the value of an IP asset in money terms.

The “NPV of cash flows” method requires the appraiser to estimate the remaining useful life of the IP asset, the projected revenues attributed to the IP asset and their timing, the projected costs attributed to the IP asset and their timing, and the discount rate to be used.

The results of the “NPV of cash flows” method are periodic cash flow projections, periodic present value of cash flow projections, a net present value of the IP asset and a value range showing the NPV of the IP asset at different discount rates and scenarios.

The results of the method can be used for management of IP assets, decision-making, supporting transactions related to the IP asset, company valuation, financing and raising capital and communication.

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