IP Valuation of the Early Stage Technology

National Workshop “Innovation Promotion and Technology Transfer”

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Topics

- Intangibles – Subject Matter of TT Agreements
- Intangible Assets Valuation – What is so Different?
- Qualitative and Quantitative Valuation
- Basic IP Valuation Methods and Approaches
- Conclusions

Intangibles – Subject Matter of TT Agreements

- **Technology transfer agreements have as a subject matter Intangible Assets – in particular intellectual property;**
- **Licensing Agreement – IP is an exclusive subject matter;**
- **Collaboration Agreement;**
- **Sponsored Research Agreement;**
- **Material Transfer Agreement;**
- **Consultancy Agreement;**
- **Confidentiality Agreement;**
- **Research Service Agreement, etc.**

Intangibles – Subject Matter of TT Agreements

- **Intangible assets** – non-monetary assets.

- **"Legal Intangibles"** – **Intellectual property (IP)** refers to creations of the mind: inventions, literary and artistic works, symbols, names, images and designs used in commerce. Once protected under the relevant IP laws – IP becomes legally enforceable right.
  - Patents
  - Trademarks
  - Brands
  - Industrial Design
  - Copyright
  - Trade Secrets / Know-How etc.

- IP is not an asset by itself – only when strategically managed by skilled professionals.
- Number of patents or other protected IP is not an indicator of innovative effectiveness of the organization, the most important is IPR management.
- **"Competitive Intangibles"** – impact competitiveness, productivity, opportunity costs, revenues, market value and share price of the organization.
  - Human capital – primary source of competitive intangibles
  - Collaboration activities
  - Organizational processes
  - Know-How
  - Business Plan
  - List of customers
  - Good will, etc.

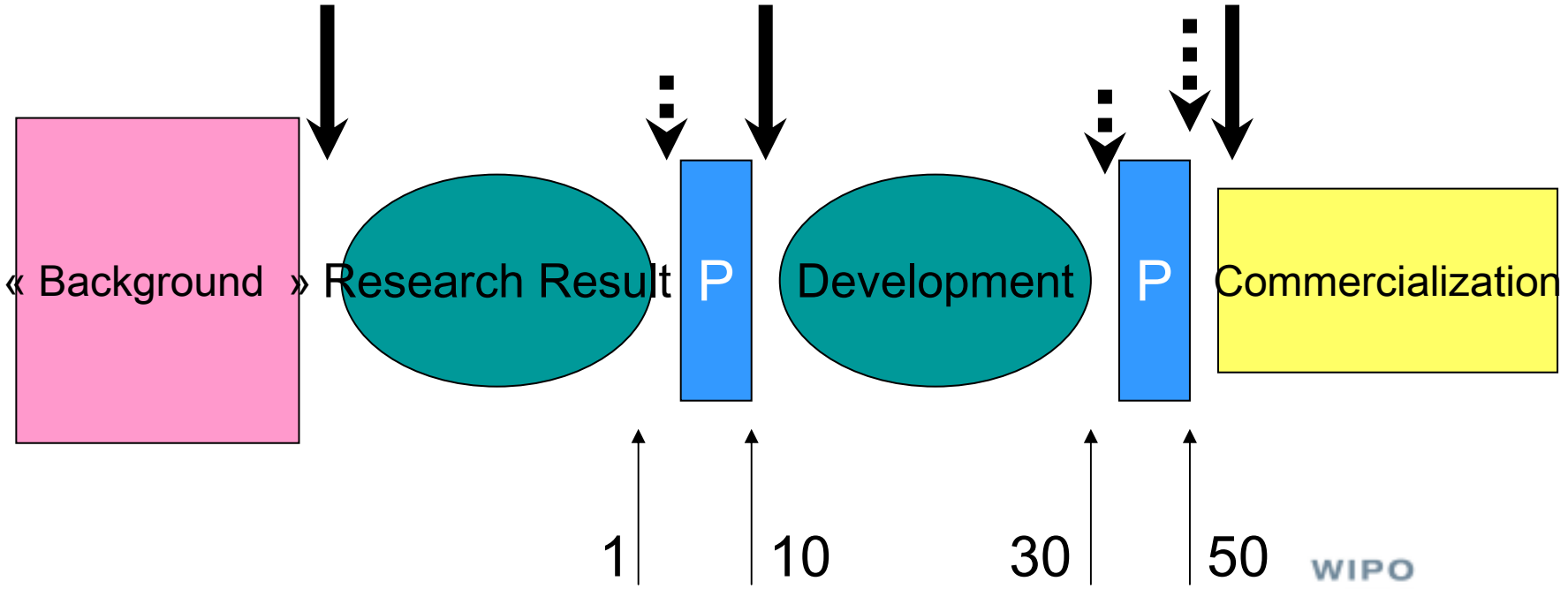
Intangible Assets Valuation – What is so Different than Valuating Tangibles?

- Valuation – The process of identifying and measuring financial benefit of an asset.
- Valuation of Intangibles – The process of identifying and measuring financial benefit and risk of an asset, in a particular context.
- Risk
  - Time – What is the time needed to bring technology on the market? Sometimes even breakthrough technology can be « too early » for the market.
  - Money – How much more do we need to invest?

- Risk is a particularly important element in the valuation of early stage technologies – more time and money needed to bring technology on the market – less value.

Risk and Money?

Closer to the market, with and without financial partner – the value of IP will be different for the same asset.



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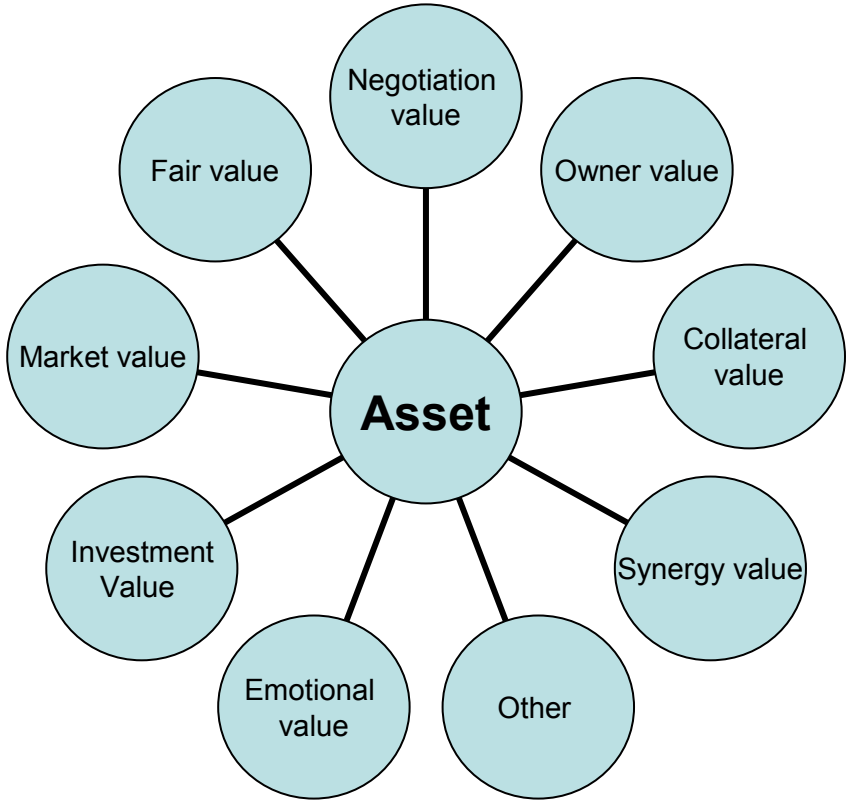
Intangible Assets Valuation – What is so Different than Valuating Tangibles?

- The price is not the value of an intangible asset, while the price of a tangible asset is usually the expression of the real value.
- The price is what is proposed to the other side of the deal and it depends on how « thirsty » is the other side for that particular technology.
- The value of an intangible is the financial benefit that an asset can generate in a particular context, taking fully into account the risk that the investment in the development of the asset may be higher than realized value.
- The potential value of intangibles depends on the context in which that value will be realized.

Intangible Assets Valuation – What is so Different than Valuating Tangibles?

- Most intangibles are capable to generate more than one value stream simultaneously.
- In certain contexts the value is determinate by the authority, relevant laws (tax laws) or empirical experiences.
- It is important to define approach to value:
  - Understand actual value of an asset in use for actor,
  - Potential value in use,
  - Value construction – for negotiation purposes.



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Qualitative and Quantitative Valuation

- IP valuation is both qualitative and quantitative in nature, as calculations are always based on qualitative analysis.
- **Qualitative methods** provide a value guide through the rating and scoring of IP based on factors which can influence its value.
- It examines, at a **micro level**:
  - the quality of intangible assets themselves;
  - their position and importance, relative to other business drivers;
  - the broader industry within which the business operates;
  - the potential value for business's competitors and potential competitors.
- The **macro-economic outlook**, over the useful life of the intangibles, for the economy in which the business operates.
- The qualitative study is used to formulate (and justify) assumptions on which the financial models, used to determine a numerical value to the IP under consideration, will be based.

Qualitative and Quantitative Valuation

- Quantitative methods attempt to calculate the monetary value of the IP and include:
  - Cost
  - Market
  - Income
  - “Rule of Thumb”
  - Monte Carlo
  - Industrial Standard
  - Real Option
  - Other Methods.

IP Valuation Methods and Approaches

Cost Method

- Cost-based models approximate IP value by determining the replacement/creation around cost of equivalent IP.
- The approach, while useful in the situation where there is no other available data – wholly disregards the innovation and uniqueness of the IP.
- There is no “equivalent” or “identical” IP – that negates the novelty and inventiveness – that define intangible assets.
- Intangible assets tend to grow over time, use and investment so their full value is not apparent at inception – that is why it is so difficult to project a real commercial value of early stage technology.

IP Valuation Methods and Approaches

- **Cost Method**
- Correlation between the cost and value may arguably be used:
  - at the pre-commercialization outset of the IP;
  - as a starting point for licensor (R&D institution) in constructing a negotiation value of the IP – licensor would like to cover the costs of development of technology and protection of the IP;
  - helps to understand the position of the other negotiation party.

IP Valuation Methods and Approaches

- This method is more appropriate for tangible assets – where cost reflects the value of the asset.
- **Disadvantages of the Cost Method:**
  - Limited effect;
  - Does not show earning power of the technology and ultimate market share;
  - Cost to “create around” – not an indicator of the value of an asset as with the time needed the technology may become obsolete;
  - “Creating around” – there is a potential danger of an infringement of the model technology;
  - Cost of development – totally wasted or dramatically understated value of the product or service.

- In TT negotiation “cost of the development” of technology is rarely accepted as an argument – “I do not want to pay for an inefficient licensor!”

IP Valuation Methods and Approaches

Market Approach

- Postulates intellectual property value as the amount for which equivalent IP was either sold or offered for sale on the open market.
- As the cost approach, there is an assumption of the existence of intangible assets that are sufficiently **equivalent to those being valued.**
- Does not take into account that in the contractual context the **IP is valued in correlation with other key terms of the agreement** – exclusivity, territorial aspects, duration, available know-how, post contractual services, etc.
- The approach also suffers from the **scarcity of available information –** IP market is still not sufficiently developed.
- If a sale price / royalty rate is made public, the amount allocated to IP from the total purchase price is not reported or other terms of contract are unknown.
- **Useful:**
  - For tempering future-income-based forecasts;
  - For valuation of early stage technology – as a starting point in income based valuation, if there is no other indicators for determining the price of the future product containing new technology.

IP Valuation Methods and Approaches

- **Disadvantages of the Market Approach :**
  - Difficult to find similar transactions;
  - If used following comparability factors should be identified:
    - Relevant time period – the future is a focal point! Expected cash flow – not price paid!
    - Financial situation of the parties – are both parties on equal footing?
    - Relevant industry transactions – similar technology in a similar industry sector – each industry has a set of unique economic forces:
      - Consumer electronics – highly competitive;
      - Airlines – oligopolies;
    - Foreign transactions – relevant only in the countries with similar economic development and legal framework;
    - What are complementary asset investment requirements – high infrastructure pre investment will diminish the value of IP;
    - Non-monetary compensation – “grant backs”, “technology share”;
    - Independent status of the parties – negotiations are different if parties are in alliances and joint ventures (Merck & Co – Johnson & Johnson).

IP Valuation Methods and Approaches

- **Income Method:** Projection of the future revenues that the IP asset can be expected to generate on the market over a certain period of time taking into account the time, value of the money and the risk that the income will not be realized.

- **Essential Elements of the Projection**
  - **Market Penetration**
  - **Sales Forecast (sales growth)**
    - Conditions of the general economy;
    - Developments in the industry in which product will be produced;
    - Conditions that will influence customers;
    - Competitors reaction.
  - **Time**
  - **Changing Value of Money (over the time)**
  - **Risk**
- **Pre-commercialization costs –** should be also taken into consideration.
- **Production Costs** – difficult to predict for an early stage technology, previous experience with similar technology can be an useful foundation.
- **Overhead costs** – historical experiences
  - Advertising;
  - Education about the new product;
  - Promotion of product on fairs;
  - Discount promotional fees;
  - Development of related intangible assets (know-how, services, training etc.).

IP Valuation Methods and Approaches

- **Different Approaches of Income Method**
  - Discounted Cash Flow
  - Monte Carlo
  - Real Option
  - Royalty Revenues
  - “Rule of Thumb” – 25% Rule

Income Method – Discounted Cash Flow Approach (DCF)

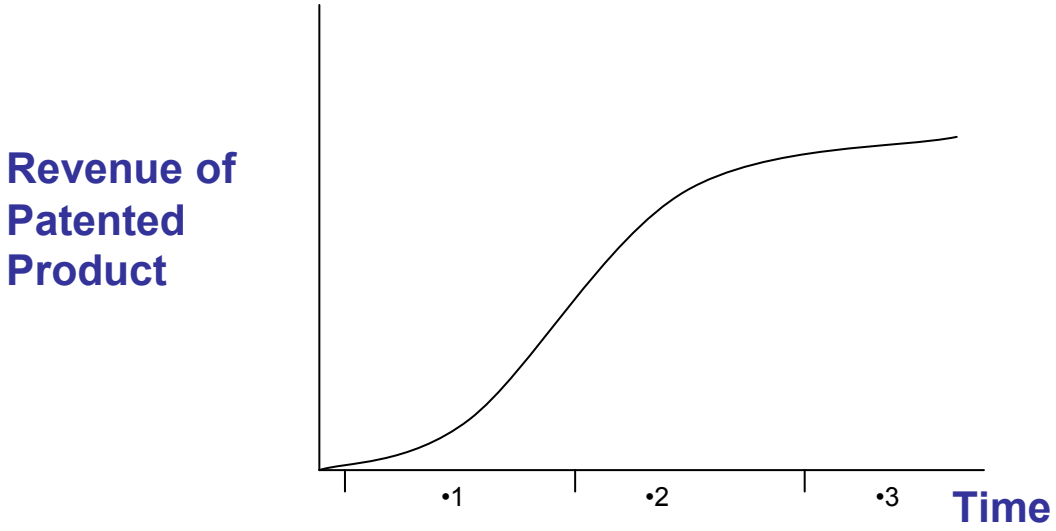
- DCF is the most frequently used approach of the Income Method;
- A projection of a **future net cash flow** expected from the commercial use of an intangible asset under review;
- Over a **period of the economic life of the IP**;
- "Discounted" by the time value of the money and **risk** ("discounted rate");
- Objective: determination of the **Net Present Value** of the IP asset.

DCF – Basic Elements

- Projection of potential revenues and expected growth determined by using:
  - Past growth rates – if data available;
  - Similar technologies – Market Method (comparables);
  - Forecast by industry experts;
  - Management's own projection.
- Growth rate change in relation with the technology diffusion.

Growth of Technology Diffusion

- Market introduction – “market penetration”
- Growth phase
- Saturation of maturity



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DCF – Basic Elements

- Time of the projection – **economic life** of the asset – efficient time of an exploitation.
- Usually shorter than the legal life, particularly in certain industries – IT, electronics.
- Pharmaceutical products – economic life prolonged even after the patent expiration – because of the strong trademark or follow-on technology.

DCF – Basic Elements

- Risk that the income will not be realized.
- “Discounting” – reducing a projected Net Cash Flow (by applying discount rate) to a Net Present Value (NPV) of the IP asset.
- Discount rate
  - the real interest rate;
  - inflation;
  - risk premium.

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How DCF Calculation Works

1. **Identify the potential market** for the product containing the new technology that in general should provide higher quality or cost reduction;
2. **Determine cash flow** that the product may generate by using the new technology. Use available data – your own (for the same or similar technology that you had commercialized) or sectarian, industrial professional data base (if available – comparable method);
3. Estimate **the expected growth** of the cash flow over the economic life of the asset;
4. **Project expected cash flow** over the period of the economic life of the asset, taking into account growth rate for each year;
5. Subtract any costs (cash outflows) that are required to generate the income in order to determine **Net Cash Flow** (as a base for further calculation).

How DCF Calculation Works (continued)

6. Discount projected future net cash flow for every year under projection;
7. To do this, estimate and apply a "**discount rate**" based on:
   - Real interest rate;
   - Expected inflation rate;
   - Risk premium.
8. Lump Sum – **Net Present Value.**

How DCF Calculation Works (continued)

$$PV = \sum_{t=1}^{n} \frac{CF(t)}{(1+r)^t}$$

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DCF – Early Stage Technologies

Early Stage Technology – high risk – as there is a delayed time to income and additional investment needed.

- **High discount rate counterbalances high risk;**
- **Delayed income and high discount rate – lower the value of technology;**
- **Technology risk very high;**
- **Commercial risk very high:**
  - Inflation
  - Competition
  - Changing economic climate.

- **Expected returns and "paydays" should be proportional to the risk and stage of technology development** :
  - Start up (protected idea) – 50%
  - First stage (prototype) – 40%
  - Second stage – 30%
  - First stage – 25%

DCF – Early Stage Technology

- Discount rate reflects risk, usually similar in the same industry sector.
- Biotechnology and pharmaceutical industry – early stage technology particularly risky.

- Professional estimations:
  - Discovery – 80 %
  - Preclinical – 60%
  - Phase I Clinical trials – 50%
  - Phase II Clinical trials – 40%
  - Phase III Clinical trials – 25%
  - New drug application – 22,5%
  - Product launch – 15%-17,5 %

- **Venture capitalists** – short term investors – 5 to 7 years to get out of investment.
- Often VC for an investment in an early stage technology would consider 50% as a reasonable discount rate – and would like to realize proportional return on investment.

DCF – Early Stage Technology

- **DCF: potentially useful method for IP valuation of early stage technology:**

- It gives a valuator flexibility to envisage different future options;
- Helps develop future IP asset management strategy;
- Relatively simple to apply.

  - **Disadvantage** of the approach – very subjective.
  - Can be corrected by using “multiple scenario” – “base case”, “optimistic case” and “pessimistic case” – by using average value.

DCF Approach in the Context of Licensing

- Value based on a royalty savings hypothesis, essentially asking (and hopefully, answering) the following question:

  "*Over the useful life of the intellectual property, what would I save by owning, rather than licensing, the intellectual property under consideration?*"
- Projection of the future royalty stream (instead of "net cash flow"), discounted for the risk and money value over the time.

How DCF Calculation Works – “Smart Turbine” Exercise

To apply formula you need information and estimation:

- Targeted Market
- Cash Flow
- Estimated Growth Market / Cash Flow
- Penetration Rate of the New Technology- “Smart Turbine”
- Discounted Rate
  - the real interest rate
  - inflation
  - risk premium

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Exercise - “Smart Turbine”

- Identify **potential market** for the “Smart Turbine”
  - Top 10 wind energy markets?
  - What would be the need for the new **installation** in this 10 top markets to provide projected renewable energy power?
  - Turbine in general represents only a part (20%) of the installation needed
- Estimate the potential **growth of the market**, based on the data available in the study, and take average value (about 23%)
- What is the **value of the targeted** market
  - To produce 1 GW, there is a need to invest about 1,5 billion Euro in the new generating equipment (1GW-1,5 B Euro)
  - Project the amount of renewable energy power needed in top 10 markets during the projected period of 6 years (do projection for each year individually)
  - To produce this energy – what is the level of investment required for the new installation?
  - As Smart Turbine is 20% of the total installation, we can consider that the value of “our market” would be only 20% of the total potential market value.

Exercise - “Smart Turbine”

- Project the **potential cash flow** from the sales of Smart Turbine per year – in the period of 5 years – or how much money we can potentially earn by selling this technology.
- Please note – this is **not our profit** – as we are suppose to cover costs as well.
- The usual **profit margin** in this sector is about 10% (which means that for covering the costs and amortization of the technology we will need about 90% of the cash flow).
- Subtract any costs (90%) from potential cash flow for each year and calculate your yearly profit or **net cash flow**.
- Bearing in mind that you are taking a risk in investing in this technology in the present moment you need to **discount** yearly net cash flow by the risk rate – which is 8%. Please note that the risk rate will grow by the years exponentially.
- **Net Present Value** – would be the total of the **discounted net cash flow** that you calculated for each year under the projected period.

Monte Carlo

- Monte Carlo Simulation – computer based sophisticated version of the multiple scenario DCF.
- For each DCF element it provides a range of possible values and different options for the distribution of these values.
- It provides projection of thousands scenarios and net present values, in a form of a frequency chart – easy to visualize the probabilities of net present outcomes.

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Real Option

- **Real Option – 1972 Black and Scholes article –** model for valuing financial options (the right to buy or sell a specific asset at the fix price prior to some expiration date) can be used for IP valuation
- Analogies made on the similar volatility of the context between financial options and IP;
- Based on income approach and DCF principles;
- Mathematically very complex;
- Required inputs difficult to determine:
  - Current value of the asset – NPV – as a starting point;
  - The variance of the value of the asset in the future (similar as volatility of the stock);
  - Expected income generated by the asset ("dividend – paid" for option – "net cash flow");
  - "Strike price" of the option – investment needed to launch the product;
  - "Economic life" of an asset – the time before expiration of the option;
  - Riskless interest rate – during the economic life of the option – long time government bond.
- **Real option method is considered by some expert as particularly applicable for valuation of an early stage technology.**

Industrial Standard

- **Standard Industrial Royalties**
- Some industries have developed standard royalty rates over the years based on what could be considered “rules of thumb”.
- Inconvenient for IP – patents and other IP aren’t commodities and thus can not be accurately valued at a set rate.
- However, if a patent is being valued for an **external transaction** within an industry that traditionally applies standard royalty rates, then the use of this standard rate in the valuation can not be totally dismissed.
- For an internal valuation, the use of standard royalty rates is not recommended.

“Les Nouvelles” – LESI Journal (September 2010)

Table 1. Running Rates by Agreement Type and Industry[1]
Median (Average in Parentheses)

Agreement Type	Industry				
	All	Software	Hardware	Medical	Pharma
All Types	5.0% (8.2%) n = 2,963	10.0% (17.3%) n = 515	5.0% (7.0%) n = 489	5.0% (5.6%) n = 520	5.0% (6.2%) n = 1,439
Product/ Distribution[2]	10.0% (15.4%) n = 339	14.4% (18.9%) n = 180	6.0% (12.8%) n = 58	5.0% (7.9%) n = 44	8.0% (12.6%) n = 57
Development/JV[3]	6.5% (9.5%) n = 482	17.0% (21.2%) n = 65	4.0% (8.1%) n = 71	6.0% (6.7%) n = 53	6.0% (7.7%) n = 293
Acquisition[4]	5.7% (9.1%) n = 350	10.0% (16.4%) n = 90	5.0% (6.4%) n = 78	5.0% (6.1%) n = 56	5.0% (6.8%) n = 126
Settlement[5]	5.0% (6.1%) n = 87	4.6% (7.6%) n = 10	6.0% (7.1%) n = 12	5.0% (5.5%) n = 33	4.6% (5.9%) n = 32
Patent (+)[6]	4.5% (5.1%) n = 570	4.0% (4.4%) n = 17	4.4% (4.9%) n = 95	5.0% (5.4%) n = 109	4.5% (5.1%) n = 349
Research[7]	4.0% (4.4%) n = 118	5.5% (5.5%) n = 2	3.0% (5.3%) n = 5	3.6% (4.0%) n = 18	4.0% (4.4%) n = 93
Bare Patent[8]	3.0% (3.7%) n = 343	3.0% (3.3%) n = 17	3.5% (3.9%) n = 56	3.5% (3.9%) n = 73	3.0% (3.6%) n = 197
Other[9]	5.0% (8.9%) n = 674	11.6% (18.1%) n = 134	5.0% (6.9%) n = 114	4.0% (5.6%) n = 134	5.0% (6.9%) n = 292

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“Rule of Thumb”

- Licensor, as developer of the technology, considers as a fair deal to get 25% - 33% of the licensee’s **profit (**not income).
- Different opinions about the value of the method.
- In practice often used as an indicator.
- It would be difficult to apply for the valuation of early stage technology as the technology is not mature for the market.

Conclusions

- IP Valuation is an ESTIMATION of an intangible asset value, thus it is not a precise figure.
- It is always qualitative and quantitative, and potentially subjective (having access to more or less same data, two valuators can always come out with different figures).
- Experience is essential!
- In contractual relations it is important to develop “starting point” for negotiation – even if there is a reasonable difference in the projection of the value, it is an advantage to be able to show reasoning behind the “value structure”.
- For an early stage technologies DCF seems to be an useful tool, with the use of other approaches and methods for determining lacking data and cross checking.

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Thank you!

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