Valuation of Early Stage Technologies: How to Reach a Starting “Price” for Negotiating a TT Agreement

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Topics

- Intangibles – Subject Matter of TT Agreements
- Intangible Assets Valuation – What is so Different?
- Qualitative and Quantitative Valuation
- Early Stage Technology
- 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, and 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.
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.
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.
“Early Stage Technology” is technology that was not still commercialized or proven beyond laboratory experiments.

Examples:
- Untested Ideas
  - Untested;
  - Unknown whether the market exist for that technology.
- “Bench” technology
  - Studies and testing had showed that technology has a promise to be successful;
  - Question – should we invest more time and money?
- Prototype technology
  - Unique, hand constructed version of the product or process;
  - Closer to commercialization;
  - Full scale manufacturing viability jet to be proven.
Early Stage Technology

- Early Stage Technology – Common Characteristics
  - Still not offered for commercial sale;
  - Industry standards have not yet been passed;
  - Government rules not applied;
  - No indication about desirability of the technology on the market.
- The most important – there is a need for more:
  - Money
  - Time
  - before the viability of technology is proven.
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

- **Market Approach**
- **Disadvantage:**
  - 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
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.
How DCF Calculation Works

1. **Identify the potential market**, for the product containing new technology that in general should provide higher quality or cost reduction;

2. **Determine cash flow** that the product may generate by using 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.

How DCF Calculation Works (continued)

\[ PV = \sum_{t=1}^{n} \frac{CF(t)}{(1+r)^t} \]
DCF – Early Stage Technologies

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

- High discount rate empresses 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.
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.
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 technologies.**
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.
### Table 1. Running Rates by Agreement Type and Industry

#### Median (Average in Parentheses)

<table>
<thead>
<tr>
<th>Agreement Type</th>
<th>All</th>
<th>Software</th>
<th>Hardware</th>
<th>Medical</th>
<th>Pharma</th>
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<tbody>
<tr>
<td><strong>All Types</strong></td>
<td>5.0% (8.2%)</td>
<td>10.0% (17.3%)</td>
<td>5.0% (7.0%)</td>
<td>5.0% (5.6%)</td>
<td>5.0% (6.2%)</td>
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<td>n = 2,563</td>
<td>n = 515</td>
<td>n = 439</td>
<td>n = 520</td>
<td>n = 1,439</td>
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<td><strong>Product/ Distribution</strong></td>
<td>10.0% (15.4%)</td>
<td>14.4% (18.9%)</td>
<td>6.0% (12.8%)</td>
<td>5.0% (7.9%)</td>
<td>8.0% (12.6%)</td>
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<tr>
<td></td>
<td>n = 339</td>
<td>n = 180</td>
<td>n = 58</td>
<td>n = 44</td>
<td>n = 57</td>
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<tr>
<td><strong>Development/JV</strong></td>
<td>6.5% (9.5%)</td>
<td>17.0% (21.2%)</td>
<td>4.0% (8.1%)</td>
<td>6.0% (6.7%)</td>
<td>6.0% (7.7%)</td>
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<tr>
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<td>n = 482</td>
<td>n = 65</td>
<td>n = 71</td>
<td>n = 53</td>
<td>n = 293</td>
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<td><strong>Acquisition</strong></td>
<td>5.7% (9.1%)</td>
<td>10.0% (16.4%)</td>
<td>5.0% (6.4%)</td>
<td>5.0% (6.1%)</td>
<td>5.0% (6.8%)</td>
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<td>n = 350</td>
<td>n = 90</td>
<td>n = 78</td>
<td>n = 56</td>
<td>n = 126</td>
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<td><strong>Settlement</strong></td>
<td>5.0% (6.1%)</td>
<td>4.6% (7.6%)</td>
<td>6.0% (7.1%)</td>
<td>5.0% (5.5%)</td>
<td>4.6% (5.9%)</td>
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<td>n = 12</td>
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<tr>
<td><strong>Patent (+)</strong></td>
<td>4.5% (5.1%)</td>
<td>4.0% (4.4%)</td>
<td>4.4% (4.9%)</td>
<td>5.0% (5.4%)</td>
<td>4.5% (5.1%)</td>
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<td>n = 570</td>
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<td>n = 109</td>
<td>n = 349</td>
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<tr>
<td><strong>Research</strong></td>
<td>4.0% (4.4%)</td>
<td>5.5% (5.5%)</td>
<td>3.0% (5.3%)</td>
<td>3.6% (4.0%)</td>
<td>4.0% (4.4%)</td>
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<td><strong>Bare Patent</strong></td>
<td>3.0% (3.7%)</td>
<td>3.0% (3.3%)</td>
<td>3.5% (3.9%)</td>
<td>3.5% (3.9%)</td>
<td>3.0% (3.6%)</td>
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<tr>
<td><strong>Other</strong></td>
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<td>11.6% (18.1%)</td>
<td>5.0% (6.9%)</td>
<td>4.0% (5.6%)</td>
<td>5.0% (6.9%)</td>
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<td>n = 674</td>
<td>n = 134</td>
<td>n = 114</td>
<td>n = 134</td>
<td>n = 292</td>
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</table>
“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.
Thank you!

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