

Incorporating Technology Maturity into IP Asset Valuation

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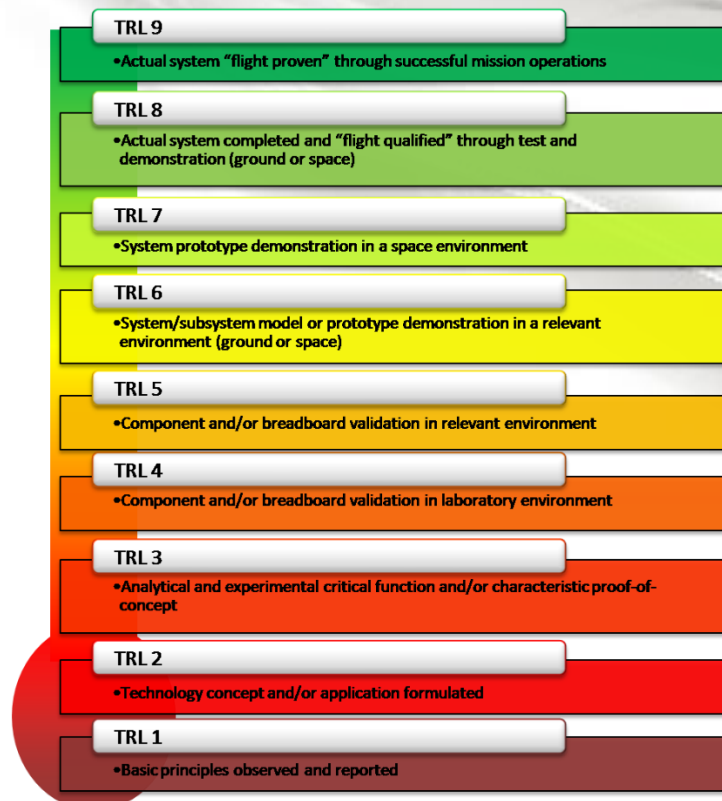
The plethora of intellectual property (IP) asset valuation models available might seem to cover the wide-ranging array of needs when it comes to asset appraisal. However, they appear to inadequately address the contribution of an individual technology and the associated IP asset(s) to revenue when the patent protected technology is commercialized. Typically this is due to lack of industry domain knowledge and / or technical subject matter expertise when selecting the discount rate or simply lacking familiarity of how the technology will likely impact the industry.

Nevertheless, one of the more noteworthy approaches that relates to technology valuation is known as the Technology Factor method. The application of a “technology factor” still leaves room for improvement, since this is typically only applied to a certain type of assets and is highly dependent on subjective evaluation.

What is required is a new type of valuation model based on technology maturity, commercialization costs, industry use (or likelihood thereof) as well as IP asset prosecution & maintenance costs. The factors which contribute to such a valuation model based on technology maturity include:

Technology Readiness Level (TRL)

A maturity level assigned to track the progress of a technology from basic concept to fully mature and commercialized. Definitions of the levels are shown in the image below:





For our interest, the TRL will determine the amount of non-recurring engineering cost related with commercialization as well as provide a guide to probability of technology and IP asset license or acquisition.

Generally, most technologies at TRL 6 or above will garner some level of interest from a manufacturing partner or investor. Nevertheless, most patent protected technologies are at TRL 3, and must make it through the “valley of death” to get to TRL 6 before commercial adoption or asset acquisition will be considered. Far too often deals are attempted with relatively mature IP assets, but TRL 3 technology. This combination significantly depresses the market value for the package.

Non-recurring Engineering (NRE) Investment

This is the amount of research & development expenditure as well as product commercialization investment required to mature a technology from TRL 0 to TRL 9. While this varies by technology, it is fairly well predicted by an experienced product manager or technologist.

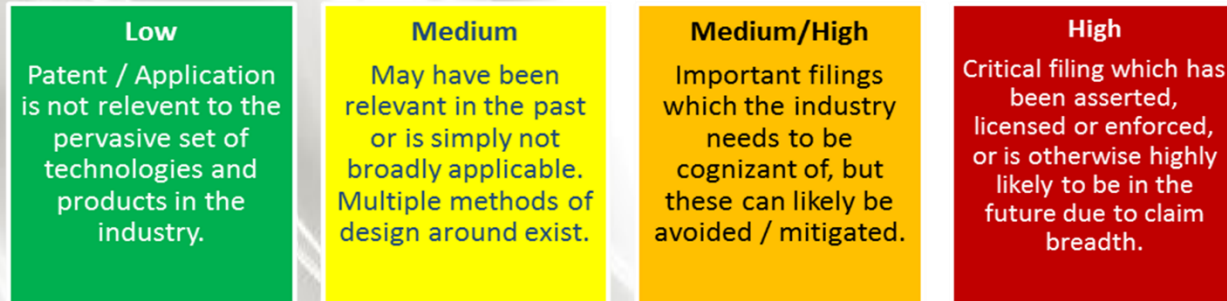
Asset Prosecution & Maintenance Costs

This should be relatively self-explanatory to IP professionals as the amount of cost associated with pursuing a patent filing through its entire life-cycle. Costs from every jurisdiction can be calculated and the cumulative total per patent family will need to be calculated.

Patent Legal Fees by Country		Australia	Brazil	Canada	China
Stage	Description	Total	Total	Total	Total
Filing	Filing Application	\$ 2,113	\$ 1,200	\$ 1,490	\$ 144
	Application Preparation				
	Preparation of Abstract				
	Preparing Drawings				\$ 76
	Translation and Typing		\$ 1,375		\$ 1,596
	Claims Over 10 / 15				\$ 304
	Pages over 30	\$ 91			
	State Designation Fees				
	Search Fee (ISA: US IPEA: US)				
	Filing Priority Document	\$ 127	\$ 90		\$ 12
	Claiming Priority		\$ 105	\$ 143	\$ 82
	Notice of Entitlement	\$ 173		\$ 230	
	Photocopying	\$ 10	\$ 10	\$ 10	\$ 10
	Postage	\$ 8	\$ 8	\$ 8	\$ 8
	Legalization of Power of Attorney				
	Miscellaneous In-House Costs	\$ 50	\$ 50	\$ 50	\$ 50
	In-House Service Charges	\$ 800	\$ 800	\$ 800	\$ 800
Filing Stage Total		\$ 3,372	\$ 3,638	\$ 2,731	\$ 3,082

Industry Usage - Product Claim Mapping

This process is typically used to determine the probability for an individual patent family to introduce potential infringement risk to the company that has released a specific product or service which utilizes that patent protected technology.



This relevance assessment per product or service offering serves the purpose of indicating the degree to which a patent owner has asserted their patent rights in the past or would be able to seek licenses or otherwise enforce the patent due to usage of that patent protected technology by their competition. This is a product specific assessment by country in which the claim breadth of each family member is evaluated.

Patent #	Title	Component	Technology	Relevance to Utility-scale WTG Industry	Company 1		Company 2	
					Risk to Product #1	Risk to Product #2	Risk to Product #1	Risk to Product #2
USXXXXXX	DC-DC CONVERTER CIRCUIT USING AN LLC CIRCUIT IN THE REGION OF VOLTAGE GAIN ABOVE UNITY	Electrical	Frequency / Voltage Regulation	M Common technology, but design around possible.	M Requires investigation, design alternatives exist.	M Requires investigation, design alternatives exist.	M Requires investigation, design alternatives exist.	M Requires investigation, design alternatives exist.
USXXXXXX	TURBINE	Drivetrain	Reliability	L Older technology, limited industry applicability.	M Requires investigation, design alternatives exist.	L Technology not present.	L Technology not present.	L Technology not present.
USXXXXXX	A PROTECTED WIND TURBINE BLADE, A METHOD OF MANUFACTURING IT AND A WIND TURBINE	Blade	Manufacturing	M Only relevant if VARTM process is used.	L Technology not present.	L Technology not present.	H Similar design architecture.	H Similar design architecture.
USXXXXXX	A WIND TURBINE AND A DIRECT-DRIVE GENERATOR	Generator	Efficiency	H Widely used technology.	H Similar design architecture.	H Similar design architecture.	H Similar design architecture.	L Technology not present.

From this assessment, the relevance to every product and service offering in the industry will be determined, and a composite industry relevance assessment will emerge for an individual patent filing.

This industry relevance assessment will then lead to a quantifiable value based on the number of Low, Medium and High filings in the industry sector. Industry benchmarking to comparable deals in which the industry relevance is known or can be assessed afterwards will provide much needed guidance.

Likelihood of Commercialization

This remains virtually the only piece of the valuation model which is dependent on a somewhat subjective assessment. However, through a combination of the other factors listed above, something more than an educated guess will emerge in order to determine the commercialization potential.

Cost and performance benchmarking will play an important role in determining the likelihood of commercialization. The performance benefit indicates the per-unit cost reduction or per-unit revenue enhancement expected from the new technology.

Similar to the industry relevance assessment above, comparable technologies within the same cluster such as manufacturing, efficiency improvement, safety and the like will be evaluated against one another. The ability to impact revenue by improving performance or contributing to a cost reduction will be compared to other commercially available technologies as well as benchmarked against other technologies under development. The lower the NRE and the higher the revenue impact, the larger the contribution to the valuation and present fair value.

The industry usage analysis for a particular assessment will drive the analysis of the number of units sold comprising the technology and its associated IP assets. This will have a direct impact on the revenue projection in the discounted cash flow based model.

Additionally, the likelihood of commercialization influences the revenue projection as well due to the rate of adoption of the product or service comprising the technology. The allocation of units per annum will require consideration and market analysis.

Benchmarking the per-unit cost or per-unit revenue against the existing commercially available solutions as well as comparable technologies at the same TRL which are within a comparable technology cluster will also aide in this process.

An example of this type of approach will demonstrate the application of this technology maturity based method. For a given technology, we can see the potential impact and revenue generated by the initial investment in the technology.

Current TRL	Desired TRL	NRE for TRL 3 to 9	Prosecution Costs	Performance Benefit
3	9	US\$750,000.00	US\$300,000.00	US\$15,000.00
No. of units				1,250
Total Revenue				\$18,750,000.00

The determination of the NRE was based on the amount required to mature the technology as well as the cost to commercialize the technology in a product or service offering. Once sufficient maturity and market acceptance is reached, NRE expenditure will no longer be necessary.

Prosecution costs are assumed to be for the full lifecycle in multiple jurisdictions. Assumptions regarding number of pages, claims, outside counsel fees as well as maintenance fees have been investigated.

Performance benefit per unit is calculated based on an understanding of the commercial value the technology will provide once introduced. This excludes the cost of commercialization for the first unit which would otherwise decrement the initial benefit. As noted above, those costs are accounted for in the NRE.

In this case, the particular technology will result in a net revenue contribution per-unit of \$15,000. The total number of units of product or service to be sold incorporating that technology can be

determined based on market projections. Typically it is necessary to evaluate the trend of product sales which comprise comparable technologies or product attributes.

A discounted cash flow (DCF) valuation method can now be utilized to determine fair value of the assets using the inputs as outlined above as the inputs. The choice of traditional DCF model to which this method can be incorporated is open. However a 'With-or-Without' or 'Greenfield' model used in combination with the technology maturity based assessment will likely yield the best results.

These two types of models can be modified most easily to accommodate the contributions from the inputs listed and are most suitable to determine commercial success of a newly launched technology within a product or service.

As a result it should be clear that industry domain knowledge as well as technical subject matter expertise will be necessary for this process, not just experience with financial analysis or even IP asset valuation. The technology maturity based asset valuation will result in a higher quality and more meaningful valuation leading to more deals executed.

For more information on innovation strategy, please visit www.totaro-associates.com and get in touch.