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Financing early stage innovation ventures – a value-oriented roadmapping framework

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Summary

This practice-oriented paper describes a value-oriented roadmapping (VRM) framework, which helps entrepreneurs improve the investor readiness of their ventures through developing better business models. As investors tend to perceive risks where entrepreneurs only have eyes for the opportunities, this value-oriented roadmapping framework is a practical tool to help bridge the gap between investors and entrepreneurs. From the daily practice of the lead author as an IP value strategist the lesson has been learned how important it is that entrepreneurs develop a business case from the perspective of potential investors.

The value-oriented roadmapping framework is a practical tool for entrepreneurs and was developed through a series of 8 case studies. The tool is a template-based approach, or so-called 'canvas method'. In a workshop setting, led by an experienced moderator, participants critically assess the venture's and or product's market, capabilities, application, revenue model, capital investment, IP-position, from an investor's point of view. Next, this qualitative assessment is translated into a quantitative assessment, incorporating finance and valuation theory and methodology. The end result is a roadmap for value creation, where in the end both investors and entrepreneurs require a reward for financial risks taken.

Author bios

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1. Overview

For an early stage company, capital from private investors can be essential, and may increase that company's chances of survival during the various stages of its development. The following characteristics of early stage companies¹ perfectly illustrate the acute challenges for securing funding for such ventures. When the venture has no history:

- Low or no revenues are being generated, resulting in a negative cash flow;
- Early stage ventures typically hold intangible fixed assets and no tangible fixed assets;
- Such ventures are dependent on private equity;
- They also have to deal with multiple claims on equity as funding is stacked through investments rounds;
- Investments in early stage ventures are difficult to convert back to cash, and are consequently illiquid;
- The majority of early stage ventures do not become commercially viable, resulting in a high 'death' rate.

As early stage ventures often rely on funding from private equity, devising a comprehensive business model is essential in order to persuade investors to accept risk and uncertainty. But new technology can outrun conventional business models. Depending on the type of product (or service) an early stage venture aims to offer, the business model itself has to be innovative.

Entrepreneurs and inventors must secure funding for various stages of development, and meet the milestones in between those stages. Seeing those stages through requires a positive attitude, total commitment and much perseverance, and in this context entrepreneurs do score highly on optimism bias. Entrepreneurs can, however, also be unrealistically optimistic, and greatly overestimate their abilities and likelihood of success². This notion that inventors can be both overly optimistic about future returns and overconfident about their abilities to ensure success increases the level of uncertainty for potential investors. Innovators are more risk seeking, opportunity seeking, and have higher levels of self-efficacy than the general population³.

1 Damodaran, A. May 2009. Valuing Young, Start-up and Growth Companies: Estimation Issues and Valuation Challenges. Stern School of Business, New York University. Source: <http://people.stern.nyu.edu/adamodar/pdfiles/papers/younggrowth.pdf>

2 Arabsheibani, G., de Meza, D., Maloney, J., & Pearson, B. 2000. And a vision appeared unto them of a great profit: Evidence of self-deception among the self-employed. *Economics Letters*, 67, 35–41.

3 ÅStebro, T., Jeffrey, S. A., and Adomdza, G. K. 2007. Inventor Perseverance after Being Told to Quit: The Role of Cognitive Biases. *Journal of Behavioral Decision Making J. Behav. Dec. Making*, 20: 253–272.

Consequently, business models devised by start-ups typically reflect this optimism about future returns and overconfidence about their abilities to ensure success. We found the business models of all 8 companies involved in the case studies (see Table 1, later in this paper) had a 'snap-shot' quality to them, and were of a predominantly descriptive or qualitative nature. Entrepreneurs and their support teams justify not forecasting a multiple term balance sheet, profit and loss account and cash flow statement because of future uncertainty regarding the assumptions made, thus the high possibility of having to modify the forecasts later. Instead they tend to work with an income statement, providing a current summary of revenues and expenses through its operating activities. As a result business models regularly have a stagnant or 'snap-shot' quantitative character to them. They lack a deeper understanding of how the company's capital structure (equity versus debt) can develop over time, like a 'stop-motion' depiction. As funding is an on-going challenge for early stage companies the continuous engineering of the capital structure is essential. A detailed and multiple term assessment can assist management to remove funding hurdles.

Where innovators are more risk seeking, investors in contrast, weigh risk against return and have a predominantly quantitative approach towards business models. They are most typically concerned with value creation. Operational risks aside, investors face risks of adverse selection due to information asymmetry as a result of entrepreneurs' optimism bias and overconfidence. As early stage ventures are characterized by negative cash flows and have no tangible fixed assets to provide collateral, they have no means to secure loans. Consequently, the funding of a venture throughout its various developmental stages can often be an Herculean task, as entrepreneurs and investors perceive and weigh risk in a different manner.

From a finance point of view, such ventures are usually not 'investor ready'. Most business models are inherently forward looking, and describe a linear course to commercial success. They are commonly based on a range of assumptions derived from management's interpretation of variables such as market trends, competition, customer needs, product capabilities, production and logistics. However, these assumptions in themselves hold a level of risk, and that level is difficult to quantify for external stakeholders, who may not specialize in the respective field. Consequently, business models for early-stage innovative ventures can suffer negatively from assumptions that they are 'high risk', specifically because such ventures have a limited track record, and commonly no forerunners or marketplace peers. This notion of high levels of risk has the potential to create a gap between ventures and potential investors.

It is our belief that entrepreneurs can improve the investor readiness of their specific venture by presenting a better business model - one that mitigates investment risk,

provides investor comfort, and takes into account various potential developments (real options). A value-oriented roadmapping (VRM) system has been developed to help entrepreneurs build better business models through a clear and consensual sense of direction and action, combining quantitative data and qualitative context.

2. Finance Issues

Investing in early stage technology is a risky business and entrepreneurs seeking private equity funding face a specific problem in that not all investors have the opportunity to fully eliminate unsystematic risk (company specific risk) through diversification. In finance, 'diversification' means reducing investment risk by mixing a wide variety of investments within a portfolio. It is these non-diversified private investors that are more prone to the snags and pitfalls arising from the information asymmetry that occurs between entrepreneurs and investors.

This information asymmetry often happens in transactions where one party has significantly more or superior information compared to another, and may result in:

- 1) Immoral behaviour that takes advantage of this asymmetric information *before* a transaction (adverse selection) or;
- 2) Immoral behaviour that takes advantage of this asymmetric information *after* a transaction (moral hazard.)

To many investors, this phenomenon increases the company's specific risk. As the required return on an investment is an expression of the perceived risk, information asymmetry can make the investor defer from committing, or to increase the required return on the capital invested. Therefore, developing an innovative business model that reduces an early stage venture's specific risk by mitigating information asymmetry can help entrepreneurs secure the required funding on suitable terms.

When building such a business model, the entrepreneur is required to think of the intrinsic added value offered by the innovative nature of the venture, as well as approaching the venture from an investor's point of view. Investors typically think in terms of:

- 1) Return versus risk;
- 2) Liquidity of their investment (converting the investment back into cash) and;
- 3) Control mechanisms.

In order for an entrepreneur to think from an investor's point of view, the descriptive business model has to be converted into a quantitative / financial business one, and assumptions have to be stated and quantified. Also to make a quantitative / financial analysis, put simply, descriptive statements have to be translated into actual numbers. So balance sheets, profit and loss statements, and cash flow statements should be modelled numerically, for example, from $t = 0$ to $t = 3$ or $t = 5$ years, depending on the specific type of industry.

Modelled forecasts provide the basis for various types of financial analyses, such as best-, base- and worst-case sensitivity analyses. Consequently, the assumptions of these qualitative business models can be scrutinized in financial terms. Too often, qualitative business models fail to pass a quantitative test, with a depletion of working capital as one of the most common pitfalls. And cash deficiency soon leads to bankruptcy. So when it transpires that a business model fails this quantitative test, the qualitative assumptions need to be revised accordingly. In practice, this revision is a typical looping process, resulting in an optimal scenario whilst staying true to the defined value proposition.

In finance, the level of required return on the capital invested reflects the overall risk perceived by the investor. Depending on the type of investor, and his/her appetite for risk, a so-called 'pecking order' is established. Generally, in most ventures, investors prefer to rate the provision of debt capital above the desire to become a shareholder. The main reasoning behind the creation of this 'pecking order' principle is that investors assume that entrepreneurs overstate the value of their ventures, thus trying to demand a higher price per share.

Early stage ventures typically find it very difficult to secure loans, a process complicated by the fact that moneylenders usually demand a positive cash flow and an acceptable debt-to-equity ratio. Additionally, investors also often demand collateral. In general, early stage ventures find it difficult to meet any of these demands, with the result that banks are not willing to fund innovative ventures. Such ventures are subsequently forced to compete in an arena characterized by private equity and VC capital funds that prefer a certain 'pecking order'. In the light of all these issues, it is fair to say that securing capital for young innovative companies is extremely difficult for entrepreneurs.

Given this difficulty, establishing the economic value of a venture becomes essential. After all, when equity investment is the predominant type of funding, what size of shareholding in a company does an investor acquire in return for his investment? As stated, the size of the equity stake that an investor demands is a reflection of required returns versus perceived investment risks. Investors are predominantly interested in

value creation, and it is authors' belief that the incorporation of finance theory and valuation methods into future-oriented business models of early stage ventures can provide investors with more comfort. In deciding whether to invest in early stage ventures that are typically risky and uncertain, investors do actually prefer and take comfort from the provision of a 'Plan B'.

The value-oriented roadmapping (VRM) system encourages alternative thinking when it comes to investments. It commands a more detailed analysis of the variables that constitute the business model, and risks and pitfalls become more transparent. The qualitative knowledge gained helps to reduce information asymmetry between the venture and the investor, providing more comfort to those investors and arguably lowering the cost of capital. In turn, the venture benefits from access to funding provided by an investor sympathetic to its particular context and needs.

In finance, discounted cash flow (DCF) analysis is generally accepted as the most suitable method for valuing assets and companies. The most commonly accepted DCF methods are the Adjusted Present Value (APV), the Weighted Average Cost of Capital (WACC) and the Cash Flow to Equity method⁴. These three methods are often applied with the premise that all investment risk is captured in the discount rate. It is this rate against which projected future cash flows are discounted to a present value, which is at the heart of the DCF principle.

As stated, a valuator faces a number of challenges when determining the economic value of an early stage venture. Typically, these ventures are non-listed, and have a very limited track record with a negative cash flow, as revenues are often low, or non-existent. Additionally, there is little data available on other ventures with comparable technology, as these companies typically operate in the non-listed arena, where there is limited obligation to publicize records. Furthermore, these young companies depend strongly on private investors and often do not survive the challenging road to market introduction and commercial success. Finally, as a result of the fact that equity investments in these types of companies are privately held, these assets can become illiquid⁵. Because of all these challenges, establishing a discount rate is problematic.

In practice, the CAPM method is often applied to establish the discount rate. This is a top-down approach, and CAPM identifies two types of risk:

4 A Practitioners Toolkit on Valuation, Part I: (Un)Levering the Cost of Equity and Financing Policy with Constant Expected Free Cash Flows: APV, WACC and CFE. De Roon, Frans, Van der Veer, Joy. 2013. Accessed through: <https://www.tias.edu/docs/default-source/Kennisartikelen/a-practioners-toolkit-on-valuation.pdf?sfvrsn=6>

5 Valuing Young, Start-up and Growth Companies: Estimation Issues and Valuation Challenges. Damodaran, A. 2009. Stern School of Business, New York University. Accessed through: <http://people.stern.nyu.edu/adamodar/pdfiles/papers/younggrowth.pdf>

- 1) Systematic Risk – market risk that cannot be diversified away. This includes interest rates, the effects of a subprime mortgage crisis, recessions and wars, and;
- 2) Unsystematic Risk (also known as company specific risk). This is the risk that a specific company is exposed to, and is the type of risk that does not correlate with the market.

The premise of the CAPM model is a sole assessment of systematic risk, as the model assumes that investors can and will eliminate all unsystematic risk by investing in large and diversified portfolios⁶. Yet the standard method of estimating betas from stock prices in the CAPM model is often inadequate, as these early stage ventures are generally non-listed⁷.

The VRM approach can support mitigation of the depth and extent of a company's specific risk, which may not initially be fully transparent. The value-oriented roadmapping approach (VRM) is a so-called 'canvas method' and will be expanded upon later in this paper. The VRM approach provides a structure to critically disassemble then re-build the venture's qualitative business case, transforming it into both a quantitative projection and a valuation. An effective implementation of the system helps to identify certain pitfalls, especially those resulting from financing policy, delays in projected revenues, regulatory hurdles, market predispositions, and barriers-to-entry. All these are identified, and their effects quantified in terms of their impact upon the economic value of the venture (i.e. asset).

As stated, when applying DFC methods, all investment risk is captured in the discount rate. Damodaran states that discount rates are often 'hiked up' to express all the uncertainties that a private company may face, including the probability of default (Damodaran, 2009). Entrepreneurs are assumed to hold an information advantage regarding the intrinsic state of the company, and as a result of this information asymmetry, the 'pecking order' theory maintains that the cost of funding actually increases⁸.

A central component of R&D is risk reduction, and that this risk is lowered in each subsequent stage of a project. The frequent practice of capturing all investment risk in the discount rate often means that an early stage venture is undervalued when applying exceptionally higher discount rates to these later stage cash flows. Given this, it seems more appropriate to apply different discount rates at different stages of

6 Financial Valuation, applications and Models, Second edition, p. 185. Hitchner, James R. 2006. John Wiley & Sons, Hoboken, New Jersey.

7 Valuing Young, Start-up and Growth Companies: Estimation Issues and Valuation Challenges. Damodaran, A. 2009. Stern School of Business, New York University. Accessed through: <http://people.stern.nyu.edu/adamodar/pdfiles/papers/younggrowth.pdf>

8 Myers, Stewart C.; Majluf, Nicholas S. (1984). "Corporate financing and investment decisions when firms have information that investors do not have". *Journal of Financial Economics* 13 (2): 187–221. Accessed through: <http://www.sciencedirect.com/science/article/pii/0304405X84900230>

development and growth. Alternatively, instead of adjusting the discount rate per stage, the investment risk can be expressed in terms of probabilities of success at the various technological development and growth stages initially faced by the venture ⁹.

Assigning confidence levels of success at various stages of development implies so-called 'options thinking'. Simply put, at every stage of the development of any given venture, there is a positive or negative chance of it being successful. In valuation theory, the method of assigning probabilities to various stages of development is called Real Options Analysis (ROA). With ROA, the assumption that future cash flows will be realized without any deviation is abandoned. ROA hinges on the view that, at different stages of development, projected cash flows and risks may vary depending on internal and external changes. This results in a more realistic view for valuation.

From an investor point of view, ROA provides more flexibility, because with early stage ventures, the degree of unique (i.e. company specific) risk is exceptionally high. Importantly, it allows the investor the option to defer and refrain from investing further at a certain stage. As taking a loss can often save money, at a certain stage of development, investors can instinctively seek the comfort of being able to step back and defer investment when new information becomes, available.

This is why, in practice, investors demand that well-defined milestones are met by the venture before making the next amount of agreed funding available. The value-oriented roadmapping system is particularly effective in identifying possible options, and the assignment of particular probabilities to these options. The system helps to map a core path to value, and allows for alternative paths towards that value, (for example, 'real options'). Thinking in terms of options provides a different perspective on uncertainty and helps to identify the characteristics of investment opportunities where uncertainty is a potential for future gain rather than just a risk of loss¹⁰.

3. Value roadmapping

The value roadmapping (VRM) process addresses these alternative paths and requires participants to assign a probability to the various options. As a result, obstacles and opportunities in the qualitative business case become visible and measurable through quantitative analyses. This options approach provides the investor with more flexibility, and the possibility to defer from investing holds an added value to the investor. By applying the system, information asymmetry can be mitigated and real

9 Boer, F. Peter. (1998) " Traps, Pitfalls and Snares in the Valuation of Technology". Accessed through: <http://www.boer.org/files/1998.pdf>.

10 Faulkner, Terrence W. (1996) "Applying 'options thinking' to R&D valuation".
Research Technology Management (May/June 1996): 50.

options can be identified and incorporated, potentially resulting in a lower cost of capital, and a more suitable pecking order in funding.

As a template-based approach¹¹, the value-oriented roadmapping system is a so-called 'canvas method'. It requires workshop participants to place coloured sticky notes with handwritten comments onto a large structured paper 'canvas'. This practical method is comparable to Osterwalder and Pigneur's 2010 Business Model Canvas (see Fig. 1)

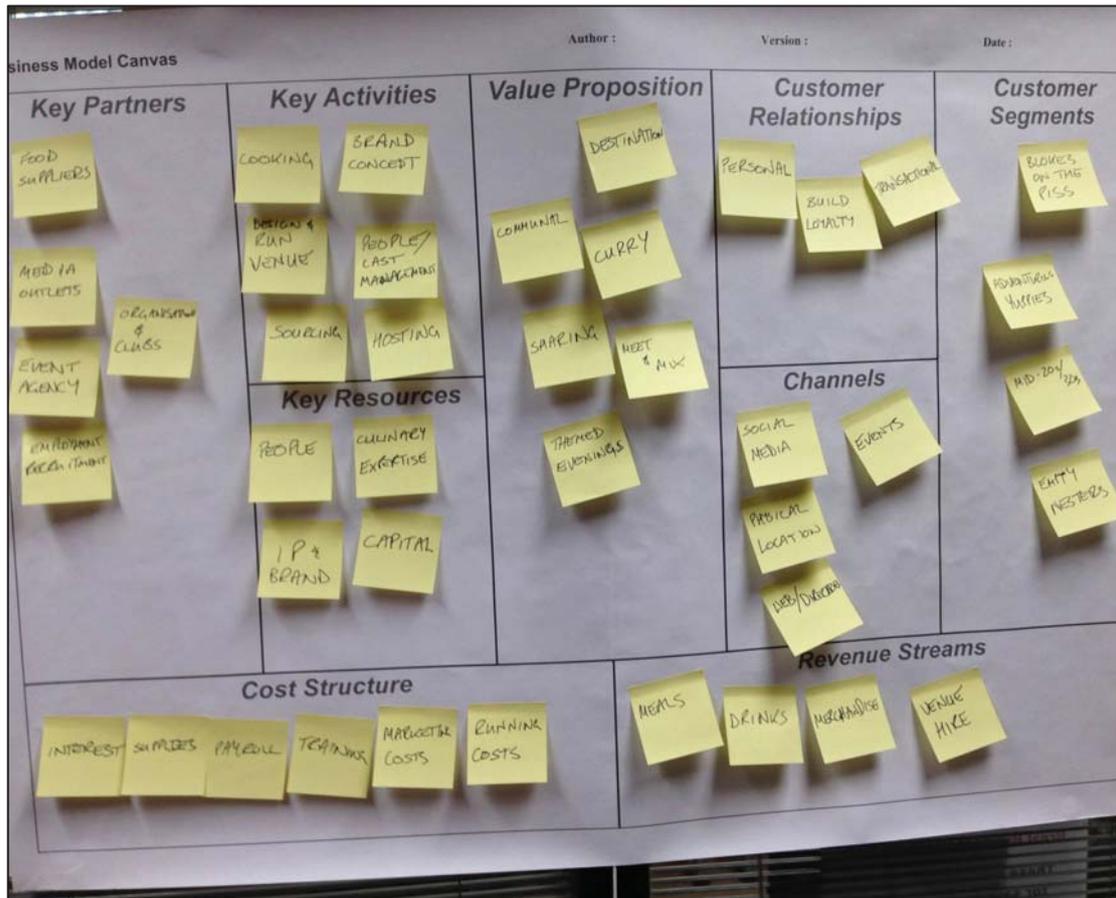


Fig. 1 – Illustration of Osterwalder and Pigneur's Business Model Canvas¹²

The VRM system incorporates and extends the Osterwalder and Pigneur Business Model Canvas in four different ways. Firstly, it builds on that canvas, using it as a 'launch pad', which necessarily leads to the pursuit of more depth and detail. Secondly, it applies 'back casting', a process through which participants first have to define and describe a successful vision for the venture, which is expressed as a point ('beacon') on the horizon. In this way, back casting results in a comparison of the vision to reality, better providing an outline of the road ahead.

11 Phaal, R., Routley, M., Athanassopoulou, N., Probert, D. 2012. Charting Exploitation Strategies for Emerging Technology. Research - Technology Management. March-April 2012. 34-42.

12 Source: www.colinnewlyn.com/wp-content/uploads/2015/04/BMC-workshop.jpg. 4th October 2019.

Thirdly, the VRM system requires entrepreneurs and workshop participants to consider alternative paths towards realizing their vision. This form of ‘options assessment’, often applied by valuation practitioners, encourages dynamic business modelling. Finally, the VRM system consist of two type of analysis:

1. A qualitative analysis, describing the model derived from the Business Model Canvas, and:
2. A quantitative analysis, translating a qualitative analysis into a financial analysis, applying finance theory and valuation methods.

By employing this combination of the back-casting feature with an options assessment, the VRM system expands and transcends the typical ‘snapshot’ method used by most of business modelling systems. The VRM approach was tested and refined through a series of workshops (Table 1 - 8 Case studies) leading to the stable template shown in Fig. 2.

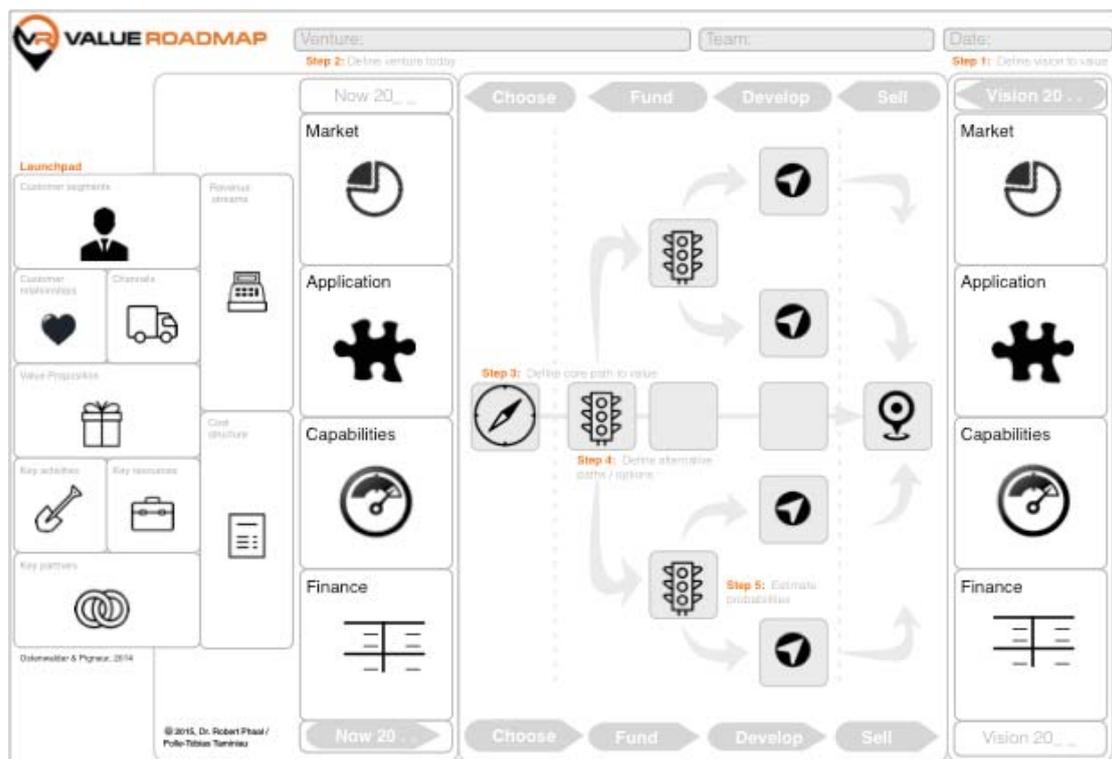


Fig. 2 – VRM Template

The ‘Launchpad’ is a rearranged visual of Osterwalder and Pigneur’s Business Model Generation Canvas. The icons in the template are explained below.

Market - Demand Side ‘WHY?’



Participants are asked to describe future customer segments, future competitors, and future competitive technology. They also describe their views on future trends and drivers, regulations, standards, and policy, etc.

Application - Supply side 'What?'



Participants are asked to describe the future value, proposition, products and services, and future business strategy with regard to marketing, sales, support, distribution, logistics and future competitive technology. Participants are also asked to describe their views on future trends and drivers, including regulations, standards, and policy, etc.

Capabilities - Supply side 'How?'



Participants describe the product's future technology and design. How are the products made, and what processes are required (x) years from now? Participants are also asked to describe perceived skills, their supply chain, IP, gaps, enablers and barriers.

Finance - Supply side 'How?'



Participants are asked to describe the future assets required to deliver the value proposition, and how the venture will be financed in the future. In order to deliver the said value proposition, participants need to make an assumption on the investments needed based upon the level of revenues the venture will generate at year (x). An estimate also needs to be made on the gross margin of the venture – the revenues/costs of goods sold. Finally, participants describe what risks they perceive regarding the sustainability of the revenues, and the gross margin.

Compass - Stepping Stone



Generally, the core path to value is determined by 'low hanging fruit' in terms of market (demand), application (value proposition), capabilities (technology) and finance (positive NPV and level of capital required).

The primary question to be answered is this:

'What application of the venture's technology or IP can generate revenues the soonest, based on an investment with a positive NPV?'

Traffic Light - Stepping Stone



The traffic light symbol refers to supposed junctions at which participants have to decide upon alternative paths to value, and the probability that the project will go ahead (green) and/or be terminated (red).

Navigation Icon - Stepping Stone



The navigation cursor indicates the actual alternative path to value. (There can be multiple alternative paths to value).



The destination icon portays the final 'destination' or objective of the chosen (core) path(s) to value. The final objective can be realised through an alternative path to value.

The five steps as depicted on the canvas are:

Step 1 - Define vision to value

Participants decide upon a year in the future, (a point on the horizon), and fill out the box 'Vision 20__'. This year defines the venture's horizon. Generally speaking we look 3 to 5 years ahead. Once the point on the horizon has been established, the moderator challenges the participants to take a leap and envisage what the venture will be like in the future (vision). Participants have to write their views, comments and thoughts on sticky notes and place them in the right-hand column of the extended canvas.

Step 2 – Define the venture today

From the future viewpoint established in Step 1. participants are challenged to 'back cast' and describe the venture in the present moment, with that future vision in mind. This provides a greater degree of focus because, instead of simply making assumptions, the participants are applying the information that they have at **present**.

Step 3 – Define the core path to value

This step is particularly pivotal, as the participants have to choose the primary marching route to value creation through market and revenues. (This primary

marching route is also called the ‘core path to value,’ where the word ‘value’ refers to shareholder value). A vital premise of economic value is the principle that shareholder value is realized through generating free cash flows. For early stage ventures, generating cash flows is of paramount importance. The venture has to try and make the transition from ‘concept’ to ‘company’ as quickly as possible.

Steps 4 and 5 – Define alternative paths to value

These steps indicate the alternative paths (i.e. options) to value creation through market and revenues. Alternative paths may need to be investigated, due to potential obstacles en-route to market and revenues. Also, with regards to options, the probability of success or failure will have to be determined. These so called ‘milestones’ provide investors with real possibilities to defer from further funding, or increase funding levels or pace.

The VRM template described above is designed for workshop deployment, but the framework it embodies the overall 8-stage VRM process (Fig. 3).

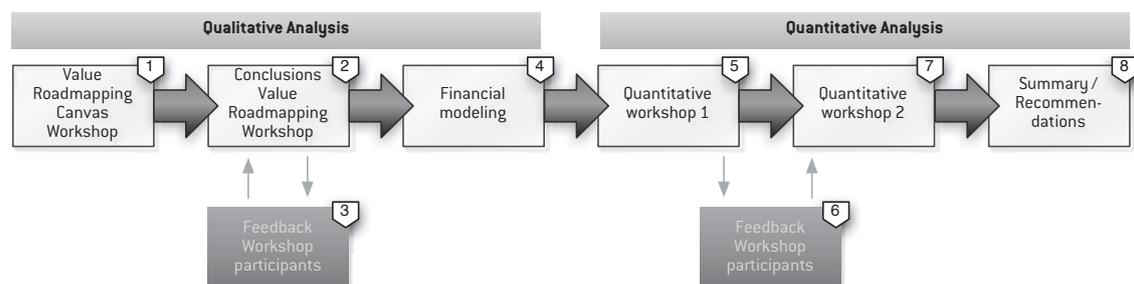


Fig. 3 – 8-stage VRM process.

Stage 1 – a workshop, in which participants fill in the VRM Canvas by writing thoughts onto sticky notes and positioning them to the various areas of the canvas (Fig. 3). A typical VRM canvas workshop takes two to three hours.

Stage 2 – the moderator draws up the conclusions of the workshop and then proceeds to Stage 3, feeding them back to all the participants for their comments and suggestions.

Stage 4 – the financial analyst builds the resulting financial models (forecasts) consisting of a balance sheet, a profit and loss account, and cash flow statements for future years that correspond with the time span of the canvas – generally speaking, three to five years, depending on the case.

Stage 5 – makes the step from qualitative to quantitative analysis. The moderator takes the participants through the financial models, focusing on revenues ($P * Q$)¹³, Capex¹⁴, Opex,¹⁵ and free cash flows. Special attention is given to changes in the working capital required, and the relationship between equity and debt.



Fig. 4 - Sticky notes with thoughts on the VRM Canvas

Stage 6 – participants are presented with the conclusions of the quantitative workshop in order to provide feedback.

Stage 7 – a second quantitative workshop takes place in order to fine tune the financial models, and let participants see the effects of certain variables (such as sensitivity analysis and value drivers).

Stage 8 – the participants are presented with the VRM summary, and all relevant recommendations.

¹³ $P * Q$ stands for Price times quantity.

¹⁴ Capex stands for Capital expenditure i.e. investments

¹⁵ Opex stands for Operational expenses i.e. costs

4. Case studies

The VRM template and has been developed, refined and tested through a series of 8 case studies, as detailed in Table 1.

Table 1 - 8 case studies - Enhancement of the value-oriented roadmapping (VRM) system

Case	Sector	Since	Innovation Context	Employees	Participants	Process
1.	Software	1998	Innovation for existing product line of established company	751-1000	4	Workshop
2.	Photonics	2011	New product for technology start-up	6-10	11	Workshop and discussion
3.	Drug delivery	2009	New product for technology start-up	6-10	11	Workshop and discussion
4.	Mechanical / Industrial Engineering	2009	New product for technology start-up	11-50	11	Workshop and discussion
5.	Food	2013	New product for technology start-up	11-50	4	Workshop
6.	Logistics & Fulfilment	2013	New product for early stage logistics company	6-10	4	Workshop
7.	Event & Infra	2011	New product for technology start-up	1-5	6	Workshop
8.	Healthcare	2015	New product for technology start-up	1-5	4	Workshop

Case 7 is summarised below to illustrate the application of the VRM template (Fig. 2) and process (Fig. 3):

Founded in 2013 this company, developing and commercialising turn-key pedestrian bridges, required growth capital. Through a Value Roadmapping workshop various growths paths to value were identified. During the process it become apparent that the 'build and sell' revenue model as chosen by the entrepreneur, would increase the volatility of the company's cash flows and require a substantial investment in fixed assets with a low value at liquidation. Potential investors could view this combination as too risky. The process led to an alternative 'license to build and market' model.

This revenue model allowed the company to have its operational risk hedged by its key licencing partners while receiving down payments on future license fees. As a result investors perceived a lower operational risk. The fact that locally operating licensees would market the product and guarantee a minimum licence fee provided comfort.

The process further led to an investment valuation which returned forecasts and analysis regarding: cash-flows; working capital required; equity dilution (capitalization table), sensitivities and economic value. This data was used to compose the information memorandum with an investment proposal based on the intrinsic

business case. As a result, the venture was able to offer investors collateral as well as an equity stake and/or subordinate loan.

The Value Roadmapping report offered investors with clear answers to their many questions, thus reducing information asymmetry while providing comfort.

5. Conclusions

It is our belief that entrepreneurs can improve the investor readiness of their specific venture by presenting a better business model - one that mitigates investment risk, provides investor comfort. Business models for early-stage innovative ventures can suffer negatively from assumptions that they are 'high risk'.

Therefore, developing an innovative business model that reduces an early stage venture's specific risk by mitigating information asymmetry can help entrepreneurs secure the required funding on suitable terms. It is our belief that the incorporation of finance theory and valuation methods into future-oriented business models of early stage ventures will provide investors with more comfort.

By applying the value-oriented roadmapping system, information asymmetry can be mitigated and real options can be identified and incorporated, potentially resulting in a lower cost of capital, and a more suitable pecking order in funding. The system helps to map a core path to value, and allows for alternative paths towards that value to bridge to gap between the entrepreneur and investors.

Although the value-oriented roadmapping system is proving to be effective, future case studies may help develop the process and template further. Particularly, regarding the visual presentation and incorporating the milestones timeline.

Methodologically, this paper demonstrates how template¹⁶ and toolkit¹⁷ concepts and approaches can be extended to good effect to address other perspectives, with finance and intellectual property considerations prominent here, in the context of technology venturing and entrepreneurship. For smaller ventures a 'guided' approach is more appropriate than the 'self-facilitating' concept¹⁸, which may be necessary for larger workshops where multiple-groups must be managed by a few facilitators.

16 Phaal, R., Kerr, C., Ilevbare, I., Farrukh, C., Routley, M. and Athanassopoulou, N. (2016), 'On 'self-facilitating' templates for technology and innovation strategy workshops', CTM Working Paper Series, No. 8, October, ISSN 2058-8887.

17 Kerr, C., Farrukh, C., Phaal, R. and Probert, D. (2013), 'Key principles for developing industrially relevant strategic technology management toolkits', *Technology Forecasting & Social Change*, 80(6), pp. 1050-1070.

18 Phaal, R., Kerr, C., Ilevbare, I., Farrukh, C., Routley, M. and Athanassopoulou, N. (2016), 'On 'self-facilitating' templates for technology and innovation strategy workshops', CTM Working Paper Series, No. 8, October, ISSN 2058-8887.