

Business Value Analysis: Coping with Unruly Uncertainty

by
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How executives can make smart decisions in the unruly uncertainty created by the digital economy? We all want to make rational decisions based on sound analysis of real data, but is it possible?

The term “unruly uncertainty” seems to capture the character of today’s decision landscape. Executives face a bewildering array of opportunities, risks, business models, technologies, standards, and strategic options. Unlike the uncertainties of the industrial economy where you could in some sense “measure the future” through forecasting, the uncertainties of the digital economy often defy forecasting, analysis, and planning techniques. For decision-makers, this makes the future less manageable and more unruly. If traditional techniques fall short, are there any emerging techniques that can provide meaningful guidance? The answer is yes, and this article surveys several emerging value-based analytical techniques that show promise, under the umbrella concept of Business Value Analysis (BVA). Instead of trying to forecast the future, BVA attempts to analyze the factors and forces that will shape the future. In this article, I focus on large-scale, cross-organization, digital economy transformation projects, often based on information technology. But other major investment decisions face similar uncertainties so the same general techniques apply.

Case Study: MegaTech

Let me first give you a vivid image of unruly uncertainty by describing a typical large-scale e-business and information technology project that executives are grappling with.

Consider the case of a multimillion-dollar Customer Relationship Management (CRM) project at a billion-dollar high tech company (“MegaTech”)¹. MegaTech serves consumer and business customers in every major country in the world, selling both directly and through a wide variety of value-added partners, distributors, and retailers. MegaTech had established itself as a leader based on technology and market share. The goal of the multi-year CRM project is to rationalize, consolidate, and automate sales, support, marketing, and customer service across all geographies. They are half way through it’s three year schedule. MegaTech is also trying to re-engineer their business to support new customer relationship and business models that emphasize recurring revenue, customer self-service, and more value-added services. Finally, this CRM system is intended to be a platform for future, as yet undefined, target marketing programs, pricing strategies, complaint handling, and market intelligence.

No doubt, this is a big, complex project. What makes this a “digital economy transformation project”? Pushing aside the hype about whether there is actually a “new economy” or not, allow me to define a digital economy transformation project as any project whose results are determined primarily by the following factors:²

1. **Speed** – Without fast decision-making and implementation, our case project probably wouldn’t be viable. Any delay by MegaTech in starting the CRM project has the potential to create a disadvantage because their competitors are pushing fast in the same direction, in effect “raising the bar” of customer expectations.

2. **Intangibles** – What has MegaTech acquired for its multi-million dollar investment? In addition to direct cost savings, they are hoping to get better customer relationships, process know-how, the ability to move fast on new opportunities, etc
3. **Connectivity** – it's not the stand-alone asset that creates value but the interconnected network of information, organizations, people, and projects. In the MegaTech case, a critical benefit will be using the CRM system to collaborate more effectively with distribution partners and even customers (self-service) and allowing them to connect to each other.

How would you establish a business case for the MegaTech CRM project?

Traditional Analysis: Discounted Cash Flow

The textbook answer is to perform discounted cash flow (DCF) analysis of the project, using the most likely cost and benefit estimates. DCF should be familiar to anyone who's been through business school or corporate finance training. Here's a quick summary.³

In DCF analysis, the value of a project to an investor is its Net Present Value (NPV) -- the net stream of cash flows attributable to the project, discounted at the opportunity cost of capital. Project cash flows are incremental, i.e. the difference between doing and not doing the project. With an appropriate discount rate, the theory goes, you should pursue any project that has a Net Present Value (NPV) greater than zero, since that will add to shareholder value. DCF analysis is based on the premise that a dollar today is worth more than a dollar tomorrow and a certain dollar is worth more than a risky dollar.

DCF Analysis has many established advantages over alternative methods:

- Clear, consistent decision criteria for all projects
- Same regardless of risk preference of investors
- Quantitative, precise, and economically rational
- Not as vulnerable to accounting conventions (depreciation, inventory valuation, etc.)
- Factors in both the time value of money and risk
- Relatively simple, widely taught, widely accepted

Both solid academic research and many years of experience in practice have shown that DCF analysis can support excellent investment decision-making, provided that the decision and investment fits the assumptions of the analysis. I certainly recommend DCF analysis to guide a decision where ever it fits and when ever it is feasible.

Above all, DCF analysis has the advantage in that it makes the decision extremely simple by reducing an entire project to a single "hard" number with a single decision criterion ($NPV > 0$). So why doesn't every company use DCF analysis on every project, including digital economy transformation projects? It's often costly or time consuming to perform the analysis because of the project size and complexity or because of data problems. With enough time, resources, effort, ingenuity, and technology, these problems can be overcome⁴, at least in principle.

Why DCF Falls Short

For our purposes, it's more important to look at situations where the project or investment decision violates the underlying assumptions, causing DCF analysis to fall short, even in principle. Here are the underlying assumptions of DCF (which aren't as widely understood or appreciated⁵) compared to the realities of the digital economy projects:

Assumptions of DCF Analysis	Realities of Digital Economy Projects
<ul style="list-style-type: none"> The only perspective that matters is the capital market investor 	<ul style="list-style-type: none"> Business value has many dimensions because there are multiple stakeholders. Not everyone evaluates ROI like a stockholder, but their buy-in is critical.
<ul style="list-style-type: none"> Projects are "mini firms" and are interchangeable with whole firms 	<ul style="list-style-type: none"> Because of network effects and synergy, firms are more than just portfolios of projects and their resulting cash flows. Projects extend beyond the firm boundary to partners, suppliers, customers.
<ul style="list-style-type: none"> Once launched, projects are passively managed like a stock portfolio 	<ul style="list-style-type: none"> Projects are actively managed through project lifecycle, including checkpoints, decision options, budget constraints, etc. Without active management in deployment and after, business value may not materialize.
<ul style="list-style-type: none"> Future cash flows are predictable in a statistical sense <ul style="list-style-type: none"> Cash flows are "expected values" - a probability-weighted average of all possibilities. Probability distributions are normal (bell shaped). 	<ul style="list-style-type: none"> It may not be possible to estimate future cash flows with sufficient confidence <ul style="list-style-type: none"> inadequate information beyond the planning/forecasting horizon unknown, indeterminate, or ambiguous cause-and-effect links; feedback loops human actors -- role of perceptions, expectations, goals, incentives, motivation
<ul style="list-style-type: none"> Projects and cash flows are independent and additive <ul style="list-style-type: none"> cash flow is cash flow is cash flow Firm is viewed as the net sum of project cash flows. Likewise, a project is viewed as the net sum of period cash flows A project is independent of it's environment, including the firm 	<ul style="list-style-type: none"> Projects and cash flows are often interdependent <ul style="list-style-type: none"> Some projects don't have benefit streams of their own, but are platforms for other projects Cash flows can be dependent on each other, both across time periods or across projects, Any series of cash flows under a budget constraint are, by definition, interdependent Projects can affect the firm's environment and vice versa (i.e. "externalities" that aren't really external)
<ul style="list-style-type: none"> Project discount rate = opportunity cost of capital, which is proportional to non-diversifiable risk All risk is completely accounted for by the discount rate 	<ul style="list-style-type: none"> There are multiple sources of business risk and variation with different characteristics, making them incommensurate. Firm and project risk can materially change during the course of a project
<ul style="list-style-type: none"> All factors which could affect the outcome of the project and value to the investors are reflected in the DCF and NPV. 	<ul style="list-style-type: none"> Because of project complexity and so-called "externalities", it may be difficult or impossible to quantify all factors in terms of incremental cash flows. Distributed, unplanned outcomes (e.g. entrepreneurial activity) can be significant and strategically important.
<ul style="list-style-type: none"> Indirect, unknown, intangible, or immeasurable factors are valued at zero 	<ul style="list-style-type: none"> Many of the important benefits are intangible <ul style="list-style-type: none"> Process capability Market position; pre-empting competitors Exploratory or learning projects Agility, flexibility Stepping-stone opportunities

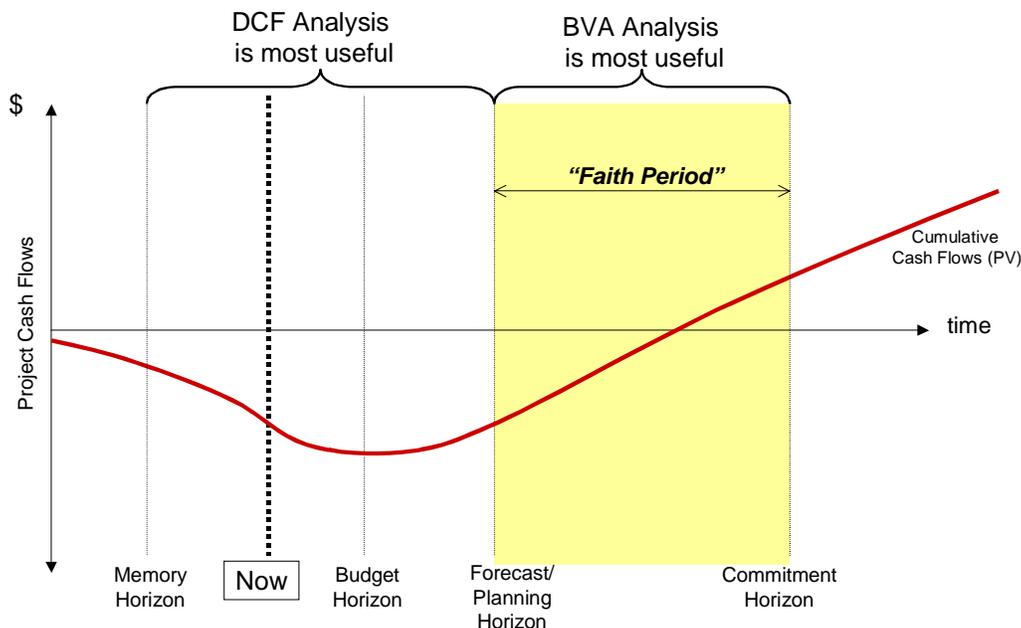
The DCF assumptions are certainly reasonable when applied to industrial economy investment decisions – income property, a new cost-saving machine tool, and etc. Therefore, it is wise to use DCF when the decision involves a relatively simple business structure, relatively simple projects, a stable environments that enable reliable forecasts, and when buy-in of other stakeholders is not dependent on the value they receive.

But, the digital economy transformation projects like our case study violate or challenge many of these assumptions, causing DCF analysis to be of limited value at best, or misleading at worst. The analysis problems become particularly severe when the time dimension is considered. Analysts face time-related difficulties regarding historical, current and future state data, summarized by four time horizons:

- Memory horizon – how far back in time do you have usable data?
- Budget horizon – how far forward in time do organizations make budget commitments?
- Forecast horizon – how far forward do you forecast (revenue, head count, channel mix, product mix, etc.)?
- Commitment horizon – how far forward you do commit yourself from an operational, contractual, technology, or marketplace point of view?

But the most difficult period for analysts is the time between the Forecast Horizon and the Commitment Horizon, a period we might call the “Faith Period”, since decision-makers are essentially operating on faith rather than solid information regarding the viability of the project during this time.

Which Analysis is Most Useful?



This leads us back to the original questions: How executives can make smart decisions in today’s digital economy? The crucial issue is how to deal with the uncertainty and ignorance we have about the future, especially in the “Faith Period”. DCF depends on forecasting costs, benefits, and risks. The less data you have and the more problems you have with that data, the more the forecast becomes nothing but a guess or accumulated assumptions. I contend that it does more harm than good to extend the analysis beyond the time

horizon where you have reasonable data. But executives need analysis that can help them take action, even when it's not possible to forecast reliably. This is the need served by Business Value Analysis.

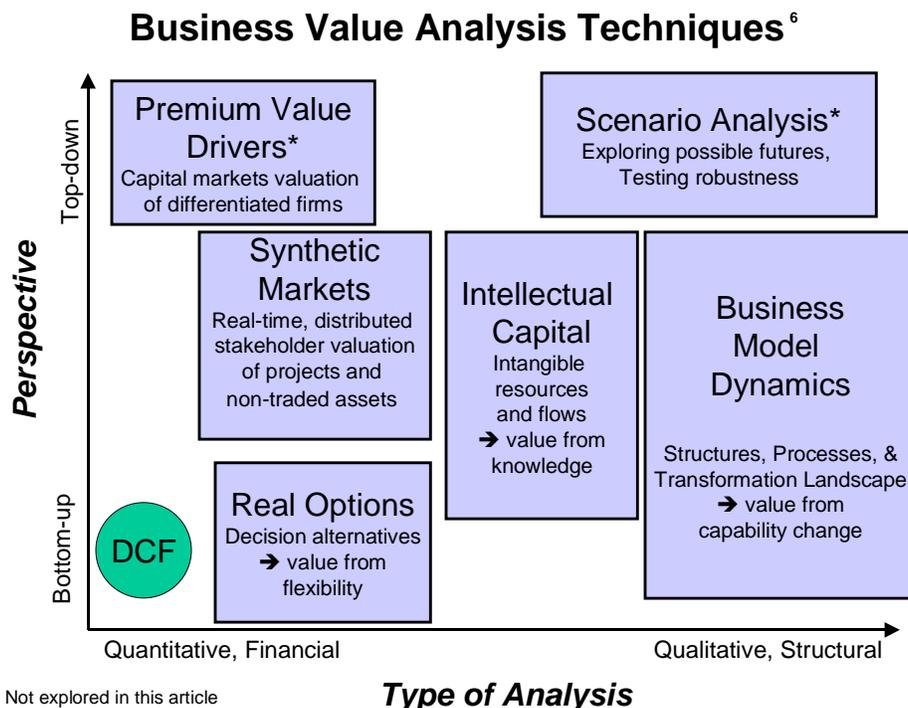
Business Value Analysis – A New Approach

Business Value Analysis (BVA) is an umbrella concept for techniques that extend DCF and other traditional financial analysis techniques to include intangibles and other factors common to the digital economy. It includes the following techniques⁶:

- Real Options
- Intellectual Capital
- Business Model Dynamics
- Synthetic Markets

Instead of trying to forecast the future, Business Value Analysis attempts to analyze the factors and forces that will shape the future

By looking at forces rather than just expected outcomes, BVA can provide more useful, more actionable information than DCF and related techniques. BVA techniques range from bottom-up to top-down and from quantitative to qualitative. In some cases, they produce quantitative measures of value. Other times, the analysis is framed in relative terms or in qualitative, structural terms.



Here's a brief survey of Business Value Analysis techniques. See the references for more details, examples, and tutorials.

Real Options: The Value of Flexibility

Real Options⁷ is the extension of financial option theory to options on real (non-financial) assets – hence the name “real” options. An option is a right, but not the obligation, to take an action in the future. For example, the right to make an investment now or wait until later is an option. Here are some other major categories of real options that are common:

- Growth or Platform Options – the option to build on a foundation position or capability
- Flexibility Options – the option to change directions
- Exit Options – the option to walk away
- Learning Options – the option to gather information to guide other decisions

Options to take action have value (however small), even if they are long shots or are currently “underwater” (negative payoff). The more uncertain the environment and the longer the option time frame, the greater the value of the option. The value of the option comes from both from the uncertainty of the investment environment *and* from our ability to take action to make the most of the opportunities created by that uncertainty.

Most digital economy projects are permeated with options. Consider the decision context of the MegaTech CRM project. It’s not a single go / no-go decision. It’s really a series of decisions – scope and approach, phasing, technology selection, architecture, functionality vs schedule trade-offs, mid-course corrections, etc. – that have a critical effect on the scale of investment, chances of success, and degree of risk. These decisions are happening in a fast-changing environment where new options where new opportunities appear all the time. Real Options gives you a quantitative method for making good decisions about those options.

Here’s simple summary of the Real Options technique in action:

1. **Frame the analysis** – define the decision, sources of uncertainty, decision rule, applicable financial market information
2. **Implement the option valuation model** – establish inputs: current underlying asset value, time frame, leakage value, volatility, private risk, risk-free rate of return. Use an appropriate option calculator (Black-Scholes model or others) to derive the option value.
3. **Review the results** – does the analysis yield a clear decision?
4. **Consider redesigning the analysis** – if the analysis is too complicated, not reliable, not enough alternatives included, improperly framed, etc.

To perform the option valuation, the analyst identifies an “underlying asset” who’s financial performance is similar to the assets involved in the decision. For example, MegaTech might identify a portfolio of publicly traded direct marketing, market research, and Dot.Com retail companies as an “underlying asset” for it’s CRM project. Ideally, these underlying assets are traded in the public financial markets, so their financial characteristics can be easily determined. (In complex decision situations, the analysis and model mathematics can get quite complex and it pays to bring in experts to assist with the analysis.)

One of the most important benefits of Real Options technique is that the value doesn’t depend on a forecast of future value, only on the following factors (which can be estimated more reliably):

- Current value of the underlying asset
- Option timeframe
- Investment cost or exercise price (cost of exercising the option)
- Risk-free rate of interest
- Volatility of the underlying asset
- Cash or other payouts of holding the underlying asset

By augmenting DCF analysis with Real Options analysis, executives can get a much clearer picture of the decision landscape they are facing. Best of all, the analysis produces quantitative, financial answers, linked to the financial market’s valuation of return on investment and risk.

Real Options is focused on particular decisions and the possibilities created by those decisions. It's less useful in understanding the intangible assets, structural transformation, and other forces that shape the future. That's where the next two techniques come in.

Intellectual Capital: The Value of Knowledge

“Intellectual Capital”⁸ (IC) can be defined as all non-financial capital available to a firm: human capital, customer capital, process capital, intellectual property, and intangible assets. The concept of Intellectual Capital is an answer to the need to manage the whole company, not just the visible part, integrating a measurement system with a holistic management strategy. It means actively managing work and projects to build the organization for the long-term as well as delivering products and services today. (It's related to the concepts of Balanced Scorecard and Learning Organization, but attempts to put those concepts into a more concrete analytic framework.)

Like all assets, Intellectual Capital can be viewed as “resources” that can be used to produce output and customer value, either now or in the future. In the IC theory, there are two types of capital in a firm: financial capital and intellectual capital. Capital flows are mediated by a firm's business model and capabilities in the context of its market environment, and determine the nature of the results the firm can produce. While the productivity of financial capital is easily measured, it's much harder to measure the investment in and productivity of IC, so it's likely that IC is mismanaged.

Furthermore, Intellectual Capital operates differently than conventional economics. It's value increases with use, and decreases without use. There are often network effects, where the value to any one user of information increases with the total number of users, often increasing geometrically. Finally, it's often widely distributed in time and space, which often hides costs and benefits associated with it.

In the MegaTech CRM project, there is a variety of project inputs and outputs that can best be understood from the point of view of IC – improved customer and channel partner relationships, process know-how, target marketing algorithms, and large-scale organization change processes. Without ways of measuring these elements, they might easily be squandered in the rush to meet more tangible numbers

One way of measuring the relative level of Intellectual Capital and capital flows is through an IC Index. The basic idea is to create a portfolio of measures or indicators across the different categories of IC, then each is transformed into a dimensionless number, and finally aggregated into an overall IC Index⁹.

Perhaps the most valuable insights from IC analysis come from observing relative investment and flows between forms of different capital – from financial capital to human capital (through training, hiring, etc.), to structural capital (process automation, information systems), and relationship capital. Most of these flows are under the firm's control and play a strong role in determining future performance beyond the forecasting horizon.

It's useful to make a connection between Intellectual Capital and Real Options. In effect, IC provides much of the resources and structure behind Real Options. This is especially true with growth options. If MegaTech's CRM project is going to create valuable growth options, then it needs to build sufficient IC, of the right variety and availability, so that MegaTech can build new capabilities on top of the initial CRM system. Otherwise, it will be “starting from ground zero” when it attempts the next phase, needing to relearn old lessons, re-analyze processes, etc.

One major short-coming with Intellectual Capital is that it's hard to make a link between IC and what a firm is actually capable of doing, how well it can compete, perform, and satisfy customers. Furthermore, it doesn't provide detailed guidance on making major transformations. That's the contribution of the next technique.

Business Model Dynamics: The Value of Transformation

With all the discussion of business models in the press and by gurus, you might be surprised to know that there is no formal theory of business models, and there are only a few people who have attempted formal business model analysis. By business model¹⁰, I am referring to the overall configuration of processes, customers, suppliers, channels, resources, and capabilities that create a profitable business. A formal business model would answer questions such as:

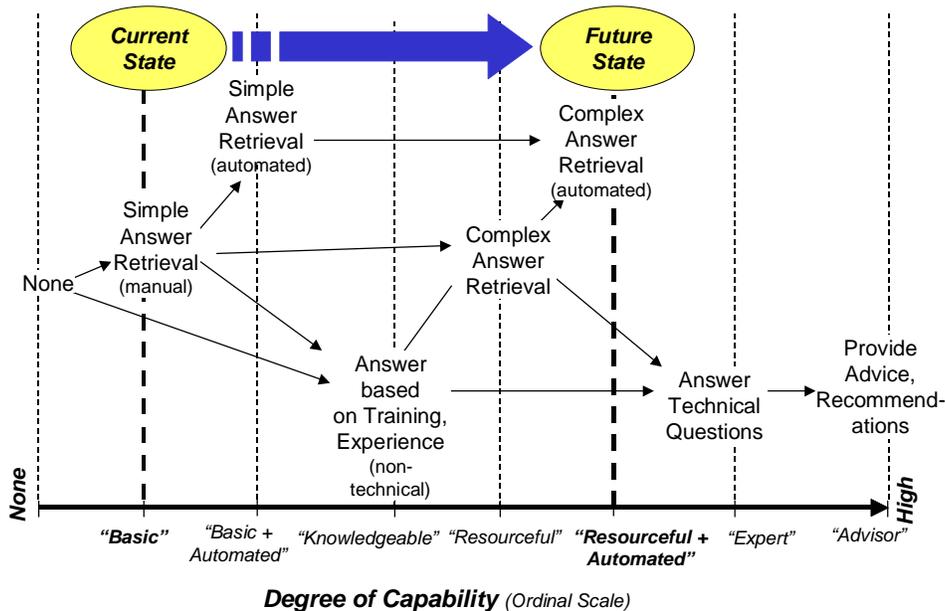
- Where does the revenue come from?
- How does the firm create value for its customers?
- How can the firm acquire, retain, and grow customers?
- What are the key assets, resources, and capabilities?
- What is the cost structure? Output volume structure?
- How does it respond to changes in the environment? How “visible” is it’s future?
- What are the key investments needed to sustain and renew the business?

Most of all, business model analysis should help a firm plan its transformation – navigate the path from “here” to “there”. For this, it’s necessary to understand a firms capabilities and how those capabilities will change in the course of its transformation.

We have used a variety of diagrammatic techniques to understand a firm’s capabilities and how they would change in the course of a transformation project. This analysis can provide a detailed specification of the state of the business capabilities in the context of a space of possibilities. This is very valuable when the Future State performance cannot be defined with sufficient reliability. With capability mapping, you can still say something very meaningful about the Future State without having to pin down its expected performance.

Specifying Capability Changes

Customer Care Example: “Answer Questions”



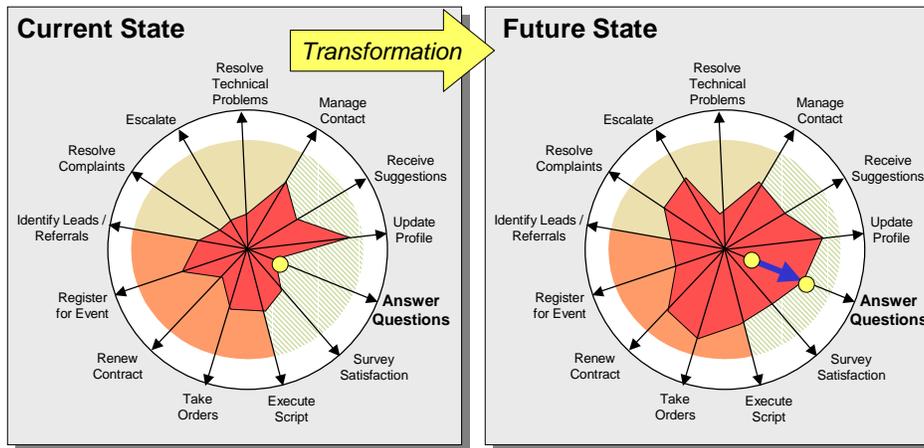
The diagram above shows how Business Model Dynamic analysis that might apply to the MegaTech CRM project. It shows how the project would change the capabilities for a Customer Care function, looking specifically at the capability for Customer Care to answer questions of customers and resellers. The first diagram shows how capability changes can be specified along an ordinal scale of increasing capability and

sophistication. (The arrows define possible paths of transformation from one level of capability to another.) These capability maps can be created by analyzing process maps and information system, as well as by looking at best practices and new technologies.

Going from the Current State to the Future State implies process changes, hiring and training changes, and information systems changes (i.e. investment in Intellectual Capital). It also presents a range of Real Options, including the growth option to turn Customer Care into a technical support function and possibly another revenue source.

The following diagram shows the proposed transformation across all Customer Care capability dimensions.

Mapping Customer Care Transformation



To complete the business model dynamics analysis, it's necessary to map these state changes within a space of competitive and customer strategy, with dimensions such as:

- Vision & Goals (“business basic” vs. “core competency”)
- Relationships & Structures (“simple/autonomous” vs. “complex/interconnected”)
- Process & Systems (“simple/manual” vs. “sophisticated/automated”)
- People & Resources (“low skill” vs. “high skill”)
- Culture & Values (“command & control” vs. “egalitarian”)
- Interconnections (“simple/few” vs. “many/complex”)

This allows the analyst to be very specific about competitive advantages (or lack thereof); the costs, complexities, and relatively difficulty of getting from “here” to “there”; and to understand cause-effect relationships between business model changes and financial performance.

Business Model Dynamics is still embryonic and needs both theoretical and practical improvements. But it has the potential to bridge the gap between detailed process, information, and financial models on the one hand, and high-level business performance on the other hand.

Synthetic Markets: emergent valuation

Modern business organizations bring together many different stakeholders with different concepts of value that are not easily or safely summarized in terms of shareholder value alone. This is an essential point because successful execution depends on the buy-in, active participation, and initiative of these stakeholders. How can the interests of all the stakeholders be brought into alignment toward the common good? How can the wisdom, insights, knowledge, and initiative of these stakeholders be communicated and mobilized?

One of the most intriguing but speculative techniques related to BVA is Synthetic Markets. The basic idea is to simulate the price creation process of a free market in contexts where it doesn't naturally exist. The theory behind it is that markets are very efficient pricing mechanisms when it involves distributed information and many different participants, risk profiles, etc., if only there is adequate market information, economic incentive to trade based on that mechanisms, and free, open, liquid markets. For firms as a whole, the stock market serves this function admirably well. But what about inside a firm? What's the "free market value" of MegaTech's CRM project?

All the other techniques described here involve analysts crunching data to produce a definitive answer. What if were possible to create a synthetic equity market for the project, with shares traded by all stakeholders, including those implementing the project and sponsoring it? (Assume for the moment that there is an automated quotation, trading, and market making mechanism available over the Internet to everyone, in real-time.¹¹)

At the start of the project, there would be an IPO of "Project Equity" and an initial share offering to stakeholders, proportional to their investment and involvement in the project. There after, the price of the Project Equity would fluctuate based on buy and sell transactions between stakeholders, with liquidity provided by automated market maker "robots". Shares could be nominally priced in fiat currency ("MegaTech Bucks") but there's no reason not to price them in real dollars, based on the actual level of investment and benefits expected.

The benefits of this approach start to become clear when you look at stakeholder incentive programs. MegaTech faces a serious problem in getting their sales force to adopt and invest time into the CRM system. From the sales person's point of view, much of the benefit flows to the company and other people, not to them. But what if they were given incentive bonuses, paid out in Project Equity, based on their contribution to the system (entering customer data, training others, finding new applications, etc.)? Not only would this align motives among stakeholders, but it would also create incentives for early investment and adoption (i.e. Get in on the ground floor to benefit from subsequent share price increases). This is exactly analogous to employee stock options in start-up companies. "Founders shares" are coveted.

Even more exciting might be the incentives it would create for entrepreneurial activity. In the case of MegaTech, the initial value of the CRM project would need to be based on the foreseeable applications and benefits of the system. But with an equity stake available to all stakeholders, it creates the incentive for any or all of those stakeholders to seek out and implement new applications. For example, new pricing strategies or customer retention programs might be created based on the customer data collected. Experience has shown that these "second wave" applications are significantly more lucrative than the first applications that are possible when a major system is first installed. The value of these entrepreneurial innovations would be quickly reflected in the Project Equity price, rewarding all stakeholders and stimulates further entrepreneurial activities.

How does all this relate to the other techniques in BVA? They are to Synthetic Markets what "fundamental analysis" is to stock market investing. It can provide information to stakeholders about the possible intrinsic value of the Project Equity. So the synthetic market would be an elegant, real-time, responsive tool for communicating value information to all stakeholders and providing the right economic incentives for project success.

Compared to the other techniques, it is the most immature and faces major practical and cultural barriers to implementation. It also requires significant further research to validate mechanisms and stability¹².

Conclusion

Business Value Analysis is a collection of analysis techniques that has the promise to provide useful guidance where traditional analysis falls short. BVA is not yet an integrated analysis technique and the theoretical foundation for it needs to be strengthened. Furthermore, more work needs to be done on the practical side – tools, supporting information systems, training, validation, etc. Once it matures and is fully developed, BVA could offer the following benefits to decision-makers:

- Clear definitions of “value” and how that relates to decisions which need to be made, for all stakeholders’ perspectives
- Analysis of the tangible, quantitative outcomes of the project, but with credibility testing to avoid unfounded conclusions
- Clear, logical analysis of non-quantified and intangible factors
- A compelling vision which provides the logic and significance for non-quantified and intangible factors
- Quantifying the value of flexibility, options, and choices
- A roadmap that helps firms navigate the transformation from “here” to “there”
- Metrics and analysis to manage projects during and after deployment to capture value, control risks, and capitalize on opportunities.

Properly implemented with supporting information systems, BVA has the potential to lead to better investment decisions and business results.

Notes

¹ A fictional company and case based on a composite of actual engagements

² Based on the three factors described in the book: Davis and Myers, *Blur: The Speed of Change in the Connected Economy*, New York: Little Brown & Company, 1998.

³ For a good introduction on DCF analysis and associated finance theory, see Brealey and Myers, *Principles of Corporate Finance*, New York: McGraw-Hill, 1996.

⁴ Some of the things you can do to compensate for the DCF analysis difficulties include:

- Make estimates and assumptions for incomplete or complex data
- Extrapolate beyond forecasting/planning horizon
- Increase the discount rate to factor in uncertainty, risk
- Backward reasoning to compensate for missing cause-effect information
- Estimate intervals or bounds for imprecise data
- Sensitivity analysis to compensate for possibly weak assumptions or estimates
- Gather more data to improve estimates, precision, or completeness of data
- Scenario Analysis to compensate for an unpredictable future
- Modeling and simulation to incorporate complex cause-and-effect
- Credibility Testing to limit the analysis if data or models are inadequate

⁵ One other assumption is that capital markets are efficient. I'm not going to argue about the efficiency of capital markets in this article, in spite of the recent Internet Bubble. Let's just agree that any inefficiency in the capital markets will have the potential to distort firm investment decisions, making our already difficult decision problem worse.

⁶ Other analysis techniques can also be used in BVA, including simulation and modeling, Scenario Analysis, Delphi consensus forecasting techniques, and Premium Value Drivers (a proprietary method of KPMG Consulting), etc.

⁷ The best introduction to real options for business people is: Amram and Kulatilaka, *Real Options*, Boston: Harvard Business School Press, 1999. The material in this section draws heavily on this book.

⁸ See Roos, Roos, Edvinsson, and Dragonetti, *Intellectual Capital*, New York: New York University Press, 1998; Stewart, Thomas, *Intellectual Capital*; and Edvinsson and Malone, *Intellectual Capital*, New York: HarperCollins, 1997.

⁹ *Op cit*, Roos, Roos, Edvinsson, and Dragoneetti.

¹⁰ There are other ways of defining a business model, including comprehensive financial spreadsheets, a process models, or information models. These variants are useful in many contexts, but don't get at the core issues facing Business Value Analysis. In particular, they are too detailed and don't give sufficient attention to capabilities and transformation.

¹¹ The technology for automated synthetic market systems already exists. Examples include the Hollywood Stock Exchange, www.hsx.com, University of Iowa Electronic Markets, <http://www.biz.uiowa.edu/iem/index.html>. See also Cal Tech Laboratory for Experimental Economics and Political Science, <http://eeps.caltech.edu/>, and the book: Myers and Davis, *Future Wealth*, Boston: Harvard Business School Press, 2000.

¹² Examples: What would be the consequences of a price bubble formed in Project Equity shares? Should it be avoided or is it healthy?