REAL OPTIONS  FIRMS PRACTICING REAL OPTIONS CAN STEER BIG, COMPLEX, MULTI-STAGE ASSETS IN DYNAMIC MARKETS. THEY DO THIS USING A RANGE OF PLAUSIBLE SCENARIOS AND MULTIPLE STRATEGIES. THEY PURSUE ACTIONS THAT ARE ROBUST TO THE RISKS AND UNCERTAINTIES. REAL OPTION VALUATION DRIVES THEIR CAPITAL BUDGETING. THEY KNOW THAT AN IMPORTANT DRIVER OF VALUE IN ASSETS IS INBUILT FLEXIBILITY. A NEW POWER PLANT, A MINING / ENERGY PROJECT, AN R&D JOINT VENTURE, A TECHNOLOGY PLATFORM, A POLLUTION REDUCTION PROGRAM, A NEW PRODUCT DEVELOPMENT, A MULTI-SOURCING STRATEGY ARE SOME OF THE WAYS FIRMS USE REAL OPTION THINKING. THE STATE OF THE ART.
PREFACE

At a recent corporate retreat, a senior-level executive of a large industrial company was asked to name his most difficult problem. Instead of citing the competition from China or rising labour costs, the executive stated simply, “trying to convince top management to approve an investment to pursue an innovative idea.”

Many managers will agree that getting a project through the investment approval committee can be one of the most frustrating and unrewarding experiences of corporate life. Battles wage. Typically, two sides develop. Business developers and strategists, who look at a project for what it might accomplish, are pitted against the corporate financiers and analysts, who look at the project for what and when it will pay back. Often the only result is a stalemate.

This paper explains how some companies are bridging the gap between the two sides. Using “real options” they apply a harder analytic edge to the intangible side of the innovation investment.

Grounded in the basic intuition that decision makers seek to “keep options open” in situations that involve an uncertain future, real options is supported by a solid financial economics foundations.

Let me describe my experience with real options. Since the 1990s I have introduced the practice of real options to companies in Asia and Australia: airlines, beverage companies, energy producers and electricity generators, infrastructure operators, miners and telcos. Projects realised a wide range of strategic benefits: better decisions on production capacity expansions, more accurate pricing of assets in competitive auctions, all-inclusive cost-benefit analysis of vertical de-integration, and full value recognition on market entry decisions.

Drawing on this experience and the work of real option pioneers such as Triantis and Borison (2001), this paper explains the practice of real options. Triantis and Borison noted three ways that real options are being used within organisations:

- **A different way of thinking**: recognising that multiple scenarios and pathways to the future are a better way to manage risks and opportunities than a single view of the future;

- **New analytics for valuation**: taking into account both flexibility and forward market prices – and integrating the processes of formulating strategy and valuing assets;

- **A dynamic decision making process** that involves a strategic conversation between the decision makers, project experts and the financial analysts – and integrates subjective judgment in project evaluation, not just hard data and the facts.

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1 The author would like to acknowledge the comments of Dr Adam Borison and Michael Collins in the preparation of this White Paper.
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INTRODUCTION: THE RETURN OF THE REAL OPTION

Some thirty years have passed since Myers (1977) coined the term “real options.” Myers’ key insight was that since the future is uncertain, it pays to invest in a range of options that allow management to capitalize on favorable opportunities – and mitigate the downside by responding to events over time in a flexible fashion.

Through the 1990s corporate finance and business strategy people together started viewing investment opportunities through a real options lens. The bursting of the 1990s tech bubble and a general lack of expertise in corporations to make effective use of real options, dampened some of the initial enthusiasm. Nevertheless, in the 21st century, real options are more relevant as ever to decision making.

The time for real options has come again. How companies respond to the big uncertain issues of our time – global economic shifts, the rise of China and India, volatile energy and commodity prices, new technologies, climate change and emissions reduction – can benefit from real option thinking.

In this next era, investments will succeed or fail depending on well they are designed to cope with uncertainty. Value will be driven by product, program and service innovation, and the ability to respond to shifting markets, new technologies, and new regulatory imperatives. When markets, technologies and regulation are changing, real options are more valuable. Managers therefore should be willing to pay for flexibility in times like today.

REAL OPTIONS AS A WAY OF THINKING

Real option thinking recognises that multiple scenarios and pathways to the future are a better way to manage risks and opportunities than a single view of the future.

Real options logic has an intuitive sense. It advises to move forward in stages when steering investments through uncharted waters: Consider a variety of future scenarios and potential strategies; favour actions that are robust to uncertainties; favour actions that yield useful information; probe, experiment and learn through doing; monitor results and adapt to changing conditions.

Steering big, complex, multi-stage assets in dynamic markets

The real options framework explicitly recognises that management always has the power to change strategy in response to changing conditions. They use levers such as: accelerate or defer, “make or buy”, switch markets, expand or contract, and so on.

By breaking decisions into stages, executives can build flexibility into their plans. When building a new plant, for example, it may be tempting to realize the full economies of scale by building the biggest facility the company can manage. But it may be wiser to first build a smaller plant that can be easily expanded later on. That way, if the market for the products the plant produces does not emerge as expected, a smaller investment has been put at risk. At that point, managers have the option to scale down or...
abandon operations. On the other hand, if things turn out well, they have the option to expand the plant.

Exhibit 1 illustrates a decision tree for a two-stage investment decision, the simplest form of real option.

**Exhibit 1 – Decision tree for a two-stage investment decision:**
by deconstructing projects into stages, flexibility is added

<table>
<thead>
<tr>
<th>Phase 1 Investment / Decision</th>
<th>Project Performance</th>
<th>Phase 2 Investment Decisions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good News</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Bad News</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

Value is created through identifying, creating, owning, managing, and exercising options such as the following:

**Planting seeds:** Experiment strategically by making a series of small investments, before making the big ones;

**Learning actively:** Decisions on a program do not always have to be made up front; conduct tests and capitalise on learnings;

**Building ramps:** Embed options to defer or accelerate, to switch direction at any project stage;

**“Failing fast:”** Build-in flexibility to abandon if conditions weaken.

**Where are companies applying real options?**

A new power plant, a marketing trial, a mining or energy project, an R&D joint venture, a technology platform, a pollution reduction program, a new product development, a multi-sourcing strategy are some of the ways firms use real option thinking.

Triantis and Borison (2001) surveyed and interviewed corporate executives from more than thirty companies in seven different industries: consumer and industrial products, financial services, high tech and info-com, life sciences, energy and power, real estate / homebuilding and transportation. Their overwhelming conclusion was that real options help managers make better investment decisions — decisions that end up creating more wealth for the firm’s shareholders.
Table 1 below shows applications of real options across most industries.

### Table 1 – Real options in industry

<table>
<thead>
<tr>
<th>Type of Decision</th>
<th>Examples of Real Options</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Asset development</strong></td>
<td>Options such as plant sizing decisions provide flexibility to change the asset development strategy in response to changing conditions.</td>
</tr>
<tr>
<td><strong>Product development</strong></td>
<td>Building options into the development process to modify new designs well into the product development cycle can add significant value to the development program.</td>
</tr>
<tr>
<td><strong>Asset leases</strong></td>
<td>Options over asset and property leases provide transaction timing flexibility if and when the market turns while locking in a price today.</td>
</tr>
<tr>
<td><strong>Platform investments</strong></td>
<td>Platforms are technological and organizational investments that permit a firm to address a wider menu of future markets. They provide flexibility in the delivering the end result, i.e., what the system might provide for different markets and future uses.</td>
</tr>
<tr>
<td><strong>Marketing strategy</strong></td>
<td>Market trials for new products can provide valuable learning prior to full-scale launch.</td>
</tr>
<tr>
<td><strong>Equipment acquisition</strong></td>
<td>Options in procurement contracts (e.g., adding or reducing the order quantity) are a common feature of contracts for aircraft and other major equipment purchases.</td>
</tr>
<tr>
<td><strong>Sourcing strategy</strong></td>
<td>Multi-sourcing in I.T. services may be more expensive but it reduces the risk exposure of being locked into one vendor only.</td>
</tr>
<tr>
<td><strong>R&amp;D and innovation capabilities</strong></td>
<td>Acquiring new capabilities is one way companies can build resilience in the face of market and technological change. A “capability” real option creates a match between current competencies and the emerging business situation.</td>
</tr>
<tr>
<td><strong>CO2 emissions reduction</strong></td>
<td>Investments in emissions reduction technologies can be more accurately valued using real option valuation; given an uncertain CO2 price trajectory, and the possibility that a better technology will be available at some uncertain date in the future.</td>
</tr>
<tr>
<td><strong>Joint ventures</strong></td>
<td>Joint ventures in emerging markets or new technologies allow learning about the true value of an investment to occur prior to committing.</td>
</tr>
<tr>
<td><strong>Global production and sourcing</strong></td>
<td>Manufacturers set up plants around the world, to enable switching of production from site to site to take advantage of fluctuations in exchange rates or operating costs. The capital cost of the multi-plant system is higher than operating one plant only, but the value of flexibility may be higher still.</td>
</tr>
<tr>
<td><strong>Mining and oil &amp; gas leases</strong></td>
<td>The ownership of a mineral lease carries with it more than the entitlement to the cash flow that it generates. It also confers on the owner a right to further develop the mine and exercise other real business options on terms that are not available to competitors.</td>
</tr>
</tbody>
</table>
REAL OPTIONS AS ANALYTICS FOR VALUATION

Valuation lies at the heart of investment decision making. “What is it worth?” “How can the full value potential be realized?” Real option analysis takes into account both flexibility and forward market prices when valuing assets – and integrates the processes of formulating strategy and valuing assets.

Valuation as an evolving paradigm

Exhibit 2 shows how project investment valuation techniques have evolved over the last two to three decades. The next section examines each of these techniques in turn.

Exhibit 2 – Evolution of valuation techniques

Don’t model risks  Model the risks

1. Deterministic discounted cash flow valuation

The first approach adopted by many corporations in the 1960s and 1970s, deterministic discounted cash flow valuation, relates the value of an asset to the present value of expected future cash flows on that asset, as depicted in Exhibit 3 below.

Exhibit 3 – The formula for discounted cash flow valuation

\[
\text{Present Value} = \sum_{t=0}^{n} \frac{E(\text{CF})_t}{(1 + k)^t}
\]

Expected cash flows are discounted
\(E(\text{CF}) = \text{EBITDA less Capex}\)

Forecast cash flows in the future, discount them, and sum them all up

The discount rate \(k\) represents the expected rate of return, and contains a risk premium

Using traditional DCF, the approach is to make a “best guess” as to how the future will pan out, lock-in the strategy, and value the project in this “expected” state of the world. So DCF asks “what are your 20 year
forecasts?” trapping managers into the mug’s game of prediction, when the real question should be: “given that we cannot predict the future outcomes with accuracy, what are our best positioning options?”

2. Sensitivity analysis

The second approach involves applying sensitivity analysis to the deterministic DCF model. Exhibit 4 shows a “Tornado Diagram” which quantifies the sensitivity of the net present value by switching each of the DCF model’s input parameters from its “high” value to its “low” value. The Tornado Diagram presents the parameters in order of importance revealing the major drivers of value.

Exhibit 4 – Tornado diagram shows sensitivity of NPV to inputs

3. Monte Carlo risk analysis

The third approach to valuation, Monte Carlo risk analysis came into vogue in the 1980s when computing power made it possible to run very quickly many thousands of valuation scenarios. Instead of single values for each input parameter, the Monte Carlo algorithm repeatedly samples values from the probability distributions of each of the input parameters – the drivers of project value and risk – to produce a probability distribution of the net present value as shown in Exhibit 5.

Exhibit 5 – Drivers of project value and risk
Exhibit 5 shows the probability distribution of project value which is computed from the probability distribution of the five cost and risk drivers: market requirement, market payoff, asset performance, cost to build, and time to build.

The chief limitation of the Monte Carlo technique, however, is that it does not take into account the fact that management can alter the strategy in response to changing conditions. In other words, the Monte Carlo valuation assumes that the strategy is set in advance, and cannot be adjusted down the track.

4. Real option valuation

The fourth approach to valuation, Real option valuation (ROV) was pioneered in the 1990s in the oil and gas and pharmaceutical industries. ROV recognises not only that the future is uncertain but also that an essential element of value in assets is their inherent flexibility. Active management of real options creates more value by limiting the downside and capturing more on the upside, as shown in Exhibit 6.

Exhibit 6 – Real Options limit the downside and capture the upside

Mathematical techniques of option pricing

Financial option valuation theory such as Black-Scholes assumes that markets are complete in that all risks can be perfectly hedged by trading securities. Such techniques provide a sophisticated treatment of market risks such as future commodity prices, but do not deal with firm-specific or project-specific risks. In other words the Black-Scholes model which was designed for valuing financial options do not work for real investments such as drilling holes, building factories or developing new products.

Instead, decision trees provide a more appropriate analytical framework. The decision tree approach to ROV recognises that markets in risk are incomplete so the key is to distinguish between “market risks” that can be hedged by trading securities (e.g., oil price risks), and “private risks” that cannot be hedged by trading securities (e.g., production risks, project cost risks, etc.). Decision trees can model both kinds of risks.
Modelling real options using decision trees

Decision tree software tools are used to build multi-stage real option valuation models with wide scope and complexity. Exhibit 7 shows an example of a new product strategy involving three real option decisions (the yellow squares) and eight uncertainties (the green circles).

Exhibit 7 – Example of a real options tree for a product development

The toolset of real options

The toolset for identifying, structuring and valuing real options is shown in Exhibit 8 below.

Exhibit 8 – The real options analysis toolset
**Framing:** Framing means determining the objectives, identifying alternatives, agreeing on what must be decided, and establishing the logic for choice. Developing a well structured decision frame leads to better and more defensible choices. Framing tools such as a decision pyramid, decision table, risk identification list, and an influence diagram are used to structure the real options problem.  

Structuring the real option valuation of the project includes the following:

- **Defining value:** How should we measure value and success?
- **Risks and opportunities; decisions and options:** What alternatives do we have now and how can we adjust to minimize risks and maximize opportunities in the future?
- **Timing:** When do we have to make these decisions?

**Modelling and data:** Modelling involves the development of a spreadsheet financial model for the Project, gathering baseline information for the inputs (including estimation of the probabilities), and conducting a baseline analysis. Tools such as spreadsheet valuation models, tornado diagrams, decision trees, and probability assessments are used for the real options modelling and data analysis.

With real options, data estimation is not so much about predicting future outcomes, but about calibrating our level of uncertainty about what might happen through the use of probabilities.

**Evaluation:** Evaluation uses the financial model together with the decision tree to value the project including flexibility options. Evaluation tools such as rainbow diagrams, risk profiles, and value of information are used for the real options modelling and data analysis.

**Decision Making:** Decision making includes communicating and documenting the analysis, assumptions, and the results and key insights for management.

**Results of a real options analysis**

ROV provides more than just a “go/no go” recommendation and a dollar value for the project. Rather, it provides a true management roadmap with milestones, decision points, on-ramps and off-ramps. This helps ensure that the project’s “optimal” strategy identified through the analysis is actually realised through management action.

**Risk profile**

The aggregate probability distribution for Net Present Value for the optimal strategy is produced. The decision then is made based on comparing probability distributions of NPV, rather than point estimates that essentially ignore the uncertain quantities and factors involved in the decision.

Exhibit 9 following shows an example of a project valued with and without its real options taken into account.

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1 A decision pyramid ranks the decisions in a hierarchy of importance. A decision table is a way to aggregate decisions into strategies. An influence diagram is a way of describing the dependencies among the probabilistic variables and decisions.
Exhibit 9 – Cumulative probability distribution of net present value

The graph shows the expected NPV of a project with real options (the vertical red line) is higher than the expected NPV of the same project with real options ignored (the vertical green line).

Optimal decisions – the value creation strategy through time

The real options analysis reveals the optimal strategy: the set of decisions both now and in the future to maximise the expected pay-off. The decision tree in Exhibit 10 shows that a different decision on “geographic expansion” is taken, depending on the “sales potential in the new market.”

Using the real options analytic model, sensitivity analysis can examine under what circumstances a different decision set would have been recommended; in other words, by how much would the input assumptions have to change before a different decision strategy becomes optimal.
REAL OPTIONS AS A DYNAMIC DECISION MAKING PROCESS

With real options the decision making process involves a strategic conversation between the decision makers, project experts and the financial analysts. Its aim is to integrate subjective judgment in project evaluation, not just hard data and the facts.

Ultimately the choice of strategy is determined by individuals’ perceptions of the investment problem, the available degrees of freedom (the options space) and a value function. What is needed therefore is a decision making process that frames the investment problem in a way that considers multiple perspectives, a wide options space and a value function that considers all relevant costs and benefits.

Exhibit 11 shows the real options decision making process. The intent is that there is interaction throughout the decision making process: to ensure that the results are high quality, and have the “buy in” to be adopted. It’s not a process of simply running the numbers. It must incorporate the expertise, judgment, and the intuition of seasoned professionals.

Exhibit 11 – The real options decision making process

An effective process for decision making has four requirements:

Make the process clear and understandable: Ensure that the process is not seen as some kind of management “mumbo jumbo.” Enable alternatives to be considered, uncertainties to be quantified, a synthesis to be developed and clear decisions to be reached.

Ensure it is an apolitical process: Debate and disagreement do not preclude a working together while testing alternative views. Executives taking part in problem formulation should question their own and others’ premises but still work together and recognize a sense of collective responsibility for the choice made.

Canvass a wide range of views: The range of perspectives considered should match the complexity of the investment problem. Compared to conventional project valuation processes, the real option approach places more emphasis on the front-end framing of the investment opportunity.

Define roles for the participants: Establish a clear process by which individuals are able to contribute and learn from one another – subject matter experts, analysts, project stakeholders, and decision makers. Include external people to expand the pool of ideas and perspectives.
Subjective judgement in the face of uncertainty

Options analysis relies on subjective judgment, and as options become more strategic, defining the real options and the criteria for success becomes more complex and subjective. They are manifestly influenced by individual and organizational values.

Subjective assessments to quantify risks and future outcomes are also required. Methods such as the Delphi technique provide ways to be more precise about managers’ “animal spirits.”

Care is needed. Otherwise real options may serve to justify, rather than guide, investment choices. Given enough volatility and time it is possible to make the real option valuation a very big number. Without solid, accurate estimates of volatility, real options can lead companies astray. Another pitfall is overestimating windows of opportunity. For example an option's value will erode as commodity prices change, competitors rush in, or new technology intervenes.

The Nobel prize winning economist Daniel Kahneman and his colleague Amos Tversky identified ways in which people make incorrect judgements in the face of uncertainty. For example:

1. We are overconfident. We are often blind to the limits of our expertise, and so a manager believes that an outcome is more certain than the facts would suggest. Cost and schedule overruns on major capital and technology projects are a case in point.

2. We escalate commitment. We invest additional resources even when all indicators point to continued failure. Sometimes a corporate culture reinforces the sunk-cost trap. If the penalties for project abandonment are overly severe, managers will be motivated to let failed projects drag on endlessly — in the vain hope that they will somehow be able to transform them into successes.

3. We anchor in the status quo. Our tendency is to adjust insufficiently from an initial position in the face of new information. When we are faced with two competing bodies of evidence concerning something important, this tension can cause us to reject or misinterpret one body of evidence in favour of our initial position.

4. We are risk averse. Our professional reputation is tied up in being right. Corporations are rewarded by the capital market for good decisions and penalised for failures, so management tends to spend a great deal of time and energy trying not to make mistakes.

2 The Delphi method is a systematic interactive forecasting method for obtaining forecasts from a panel of independent experts. See Rowe and Wright (2001).
STRATEGY AS THE CREATION OF OPTIONS

Real option thinking is a powerful way of framing business strategy — as the creation of options and opening up new choices in an uncertain world. Exhibit 12 shows the four steps in an options-based strategy process.

Exhibit 12 – Framework for strategy

1. Anticipate the Future
2. Formulate the Strategy
3. Assemble the Options
4. Execute the Strategy

Anticipate the future business environment: Identify drivers of change, build the future scenarios, and explore the scenario implications. Refer to Horton (2006) for a discussion on how scenario planning works.

Formulate the strategy: Define the goals and scope, strategic rationale, and how success is measured.

Assemble the portfolio of real options: The portfolio may include real options which are defensive and focused on avoiding downside risks — for example deferment or abandonment options. The portfolio should also include options which make the most of the opportunities — for example growth options, acquisitions and new product R&D to embrace up-side risk and make the most of the emerging market and technological opportunities.

Execute the strategy: Monitor performance and the business environment, and manage the portfolio of options; acquire, scale up, accelerate, defer or abandon options as appropriate.

Strategy and organization in the real options enterprise

Strategy and organization in the real options enterprise is different. The proverbial Martian, having visited the planet of “zero options” and observed enterprises there, would notice some vital differences when she next visits enterprises on the planet of “real options.”

The economy on the planet of real options is more innovative. It’s a world brimming with joint ventures, strategic alliances and other “hybrid” forms of organization.³

³ Kogut (1991) identified that joint ventures can be thought of as options to expand, providing flexibility in an uncertain world. They allow learning about the true value of an investment to occur prior to committing to new markets or technologies.
One feature our Martian notices in the real options enterprise is that not all of the company’s resources address the near-term demands of the business. The company deploys a diverse base of talent, assets, partnerships, and other resources to exploit growth opportunities and hedge against shifts in the business environment.

Experimentation is valued. But this experimentation is backed by an innovating norm to “fail small and succeed big.” Managers in the real options enterprise know that the companies which succeed over the long term are those running most of the successful experiments. A high failure rate is positive since, in an evolutionary sense, seeding the enterprise with enough variation provides the basis for future innovation and adaptation. As long as losses are bounded, a higher failure rate is acknowledged as a positive for long term success.

Our Martian would notice that firms practicing real options invest more in intelligence gathering. They spend time noticing possibilities. They take more calculated risks, but keep costs down until major uncertainties are resolved. They approach development in stages and sequence investments.

They fail fast. Failing projects – even those with large sunk costs – get abandoned since managers know why and when to “pull the plug.” For managers and employees it’s the difference between “having an option” and “being an option.”

**Culture and organization in the real options enterprise**

The organizational culture in the real options enterprise has overcome the “anti-failure bias.” Incentive structures have been put in place to remove the stigma of failure. This reduces the costs of failure to the individual manager and makes action more attractive. The real options enterprise has also overcome the problems of accountability that accompany the strategic pursuit of flexibility.

In the real options enterprise the culture is non-hierarchical. What’s valued is a good idea for experimentation, not the level in the organization where the idea came from. Senior managers turn a blind eye to maverick activities, since these maverick communities allow the organization to step outside its “limiting worldview” and try something new.

**Investment decision making on the Planet of real options**

Our Martian notices that the CEO in the real options enterprise does not like to throw big budgets at risky projects or acquisitions to excite the market. “Big bets” and the “damn the torpedoes, full speed ahead” approach are frowned upon. As the CEO puts it, “if we are making a big bet, it means we failed somewhere earlier.”

The Martian notices that the emphasis on exploration and opening up options is integral to the investment decision making process. Strategic initiatives are never looked at as standalone investments, but rather as links in a chain of interrelated, staged investment decisions.

Real options analysis underpins capital budgeting. In fact the special term “real options” is now just called “capital budgeting.” Head office routinely approves projects with negative net present value (calculated using deterministic valuation methods), provided projects have compensating option value.
Building an organizational capability in real options

Like any new “technology” real options involves some essential organizational changes for successful implementation.

Barriers to adopting real options approaches

Individual and organizational barriers can impede the introduction of a real options approach, as shown in Exhibit 13.

Exhibit 13 – Barriers to succeeding with real options

Barriers include knowledge gaps. There may be a lack of conceptual understanding and confusion about the techniques of real options. The capital budgeting process may be locked-in to deterministic approaches to valuation, not recognising that incorrect decisions may be made on projects using this criterion.

Overcoming the barriers

Because the decision technology can be bought, or knowledgeable people hired into a firm, it is the organizational constraints that are often the most binding when implementing real options. These need to be overcome in the following ways:

- Address the “anti-failure bias.” Changes may be required in incentive structures to foster more risk taking, and to encourage the habit of abandoning failing projects quickly;
- Integrate the processes. Real-options analysis needs to become embedded in the capital budgeting and strategic planning processes; Staff and management need to understand the nexus between the processes of formulating and valuing strategies.
- Make sure there is top management support.

Capabilities in real option processes and analytics will need to be developed. The implementation plan should therefore include the selection of a demonstration project, the establishment of a working group to coordinate the real options work, and training of real option specialists in key business areas – corporate finance, business development, marketing, R&D and strategic planning.
CONCLUSION

In a world of change and uncertainty, real option thinking is more important than ever for strategic investment decision making. Business environments are not getting more stable or any easier to compete in. But in fact, a bigger menu of uncertainties in today’s dynamic business world provides innovators with new opportunities to create new kinds of value – real option value.

REFERENCES


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