

Real options in the digital economy

The digital economy is unfamiliar territory for many managers. The best response, say *Nalin Kulatilaka* and *N. Venkatraman*, is to think in terms of “real options” – strategic investments that maximise opportunities.

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Look around and one thing is clear in this uncertain world: every company is trying to figure out how to position its business for the internet age. Some are designing business models expressly to leverage the internet’s functionality. Others are trying to figure out how to run their Web operations alongside their traditional business operations, in the hope that they will have time to identify conflicts and synergies. Still others have registered a Web address and created electronic “yellow pages”, and are unsure how to proceed.

At the same time, significant wealth has been created on the US stock market by internet start-ups over the past year. Whether or not this is “irrational exuberance” (the expression Federal Reserve chairman Alan Greenspan used to characterise the market back in 1996), many internet companies are judiciously converting their lofty market capitalisations into real assets and capabilities to position themselves for the digital economy. For example, online auctioneer eBay’s acquisition last April of Butterfield & Butterfield – a large San Francisco auction house – should ultimately enable it to compete against long-established players such as

Sotheby’s and Christie’s.

These actions are forcing traditional market leaders to reassess their strategies. Tried-and-tested approaches to strategy formation, developed and perfected in the industrial age, seem to be unsuitable for the new market realities. There is a growing sense of urgency about the need to craft successful strategies for the digital marketplace.

Companies now realise that the internet is not a toy; it is no longer a question of whether the digital space is relevant but of how best to incorporate it into business strategy. The goal is to develop a business strategy that *includes* the Web, rather than a separate strategy *for* the Web.

Principles for strategy formulation

In this article we develop three principles – distilled from our research and professional experience – for crafting strategies in the digital age. These principles are based on the concept of *real options*.

In the financial world, options are contracts that give one party the right to buy or sell shares, other financial instruments or commodities from another party within a given time and at a given price. Whether an option holder decides to exercise the

right to buy (or sell) depends on the prevailing market conditions.

Real options follow a similar logic. Like financial options, these strategic investments can give companies the option to capture benefits from future market conditions. The characteristics and uses of financial and real options are summarised in Table 1. The term “real options” was coined by Stewart Myers of the Massachusetts Institute of Technology

and minimise risk; high-risk projects can easily be discarded in favour of moderate-risk projects.

In this approach, risk is assessed under the assumption of predictable market conditions, using “what if?” scenarios. The risk of major failure depends upon the likelihood of shifts in technology and the emergence of substitute products or processes. Opportunities too are analysed using models that assume predictability.

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in 1984 in an article discussing the gap between strategic planning and finance.

Our principles build on the insights gleaned from real options analysis but do not rely on sophisticated mathematical analysis. They are intended to promote a new way of thinking about the digital era.

1. Pursue possible rather than predictable opportunities

Strategic planning has historically centred on selecting the most attractive opportunities from a set of alternatives. This process is guided by fundamental questions such as “What business are we in?” and “What is our competitive advantage?” Managers focus on finding lines of action that maximise return

Threats from new entrants are evaluated by looking at companies with related resource pools from one’s own industry or neighbouring industries. Logical avenues for growth are product extensions in one’s current markets or market extensions for one’s current products. Naturally enough, the industry – defined in terms of products and production – is a key construct for defining opportunities in the industrial economy.

Opportunities in the digital space are anything but predictable. Instead of striving for predictability, managers should explore a range of possibilities. If we continue to use predictable models, we will miss out on many new avenues. This is because opportunities are not obvious in their initial stages; by the time they become apparent, the window has closed.

Table 1: Characteristics of real and financial options

	Financial options	Real options
Contract form	Specified by legally enforceable contracts.	Contracts are vague and implicit.
Valuation and trigger points	Depend directly on traded security prices. Arbitrage-based valuation models are very precise.	Imperfectly proxied by market prices. Valuation models are less precise.
Acquisition	Purchase of options involves market transactions or bilateral contracting.	Purchase of real options involves a variety of actions that modify a company’s real asset base and capabilities.
Exercise	Mostly involve security market transactions.	Involve a variety of actions, such as the purchase or sale of real and financial assets, entering into contracts, alliances or partnerships, entering or maintaining existing markets, and launching or scrapping projects.
Uses of real and financial options		
Leverage	Small investment to generate large exposure.	Invest entry stakes (pilots, prototypes) to retain ability to play in potential markets.
Insurance	Provide floor levels to portfolio values.	Ability to change a strategy by switching out of a product, technology or market.



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Traps to avoid when first doing business on the web
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Managers must therefore abandon traditional industry definitions and boundaries as referents for exploring opportunities. New business models are likely to redefine industry characteristics (it is myopic to think that Amazon.com is simply an online bookseller, for example). Opportunities will emerge through the convergence and integration of historically disparate industries. For example, the consumer electronics and computer industries are blurring; the next innovation in the computer industry may not be an Intel-based device, but a Sony PlayStation that can hook up to the internet.

The conventional approach involves ranking opportunities in terms of risk/return profiles under fixed assumptions about the future; projects above a certain threshold can be pursued. In contrast, we urge managers to go beyond a single-point estimate of the future, based on current assumptions and one selected trajectory. Instead of fully funding a small set of moderate-risk projects, companies should pursue a broader array through real options. This means making a series of strategic investments – whose value will vary in response to numerous converging and conflicting forces – to keep an array of opportunities open.

Microsoft has mastered this art. In May this year, it invested \$5bn in AT&T, the US's largest cable provider. This should enable Microsoft to pursue its goal of setting the standard for the operating system in television set-top boxes (through which viewers have access to the internet and interactive television). Also in May, Microsoft invested \$600m in Nextel, the US mobile services group, to pursue wireless internet and data services. Microsoft is also

uncertainties were resolved in a way that tended towards a groupware package. In some cases, the pilot investments provide the additional benefit of learning about alternative business models. Other scale options in the digital economy include migration and scaling up of operations and business processes on the Web.

Scope options give companies the flexibility to choose input and/or output mix. As demand conditions (for example, prevailing prices and tastes) change, a company with scope options can change the mix of products and services it offers. And as input prices and technology change, a company can change the way it makes its products and services. The shape of the digital business is uncertain and it is suicidal to constrain its scope prematurely. A good example of a company that has realised scope options is Amazon.com. It has moved from books to music to videos, and its recent acquisition of

drugstore.com gives it an option to incorporate medical products. At the same time, it has incorporated auctions as a selling mechanism.

Timing options allow a company to be flexible about when to commit to different opportunities. When scale and scope economies are large and the company is operating in uncertain markets, having the flexibility to choose when to invest (to enter a market) or to disinvest (to abandon a market) is of great value. While it may be wise to keep your options alive and postpone such decisions, holding on to options for too long may close some windows of opportunity.

2. Explore multiple avenues to acquire your options

Companies can obtain real options from multiple sources, including alliances and partnerships.

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collaborating with network television company NBC to produce MSNBC, an online news site and television channel launched in 1996.

When pursuing possible opportunities, managers should consider the following categories of options: scale, scope and timing.

Scale options enable a company to be flexible about the scale of operations, depending on how the market pans out. Often they involve committing investments in stages, allowing follow-on investments to be made if needed. For example, Lotus developed Notes through multi-stage investments that were made as multiple technological

Unilever, for example, is anxious to benefit from the digital space and has entered into agreements with Microsoft, America OnLine (AOL) and NetGrocer. As the president of home and personal care for North America observed when announcing these alliances: “None of us truly knows how the internet will change the manner in which consumer goods companies communicate with consumers because this technology is being developed rapidly.”

Acquisition of options is of the essence of strategy: strategy is not about the future but about the future implications of current decisions and



actions. Strategy is not about imitation but about responding to weak signals. The challenge is to shift management's preoccupation away from adding business lines (through the familiar avenues of mergers and acquisition whose value can be assessed) and towards the acquisition of capability options (whose value is harder to assess).

There are four different avenues for acquiring real options; collectively, they provide a strategist with the tools to maximise a company's potential to reap value in the digital space. As in Figure 1, each

one can reliably predict where the convergence of computing and television will end. While Microsoft's Windows has emerged as the dominant operating system for computers, its dominance could be lost to television. Just as IBM failed to see the shift away from mainframe architecture towards Wintel (Windows-Intel) architecture, Microsoft could suffer if it does not take positions in the broader marketplace. Consumer electronics companies such as Sony and cellular phone companies such as Nokia and Ericsson are already bat-

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can be characterised in terms of the level of investment it requires and whether or not other players need to be involved.

Entry stakes. These are options inside a company that allow it – but do not oblige it – to act. Typical entry stakes are registration of a web address and creation of online “yellow pages” (“brochureware”), both of which give a company the option to evolve subsequently. Disney, for example, began with a simple set of features online and has since evolved into a major portal. Nike started out with brochureware and is now in the midst of assessing how best to export its broader strategy to the Web. Once acquired, entry stake options must be maintained to keep them alive.

Risk pooling. This strategy involves arrangements with external players, such as equity investments, licensing and other types of contract. NBC has orchestrated a web of alliances in developing its NBC Interactive initiatives. Disney is doing similar thing for its Go channel. Given the digital arena's profound uncertainties and multiple possible futures, risk pooling makes sense.

Big bets. Some companies have made major commitments to the digital space. When US computer supplier Egghead abandoned its physical stores and moved its business online, it placed a hefty bet on the new infrastructure. Few other companies have not been quite so bold, but many – including brand leaders such as Gap, Disney and Wal-Mart – are placing substantial bets. Toys R Us is creating a separate unit to expand its online presence aggressively. Schwab committed significant resources to the Web and in the process has emerged as a leader in electronic commerce. While it is unclear what the successful trajectory might be, the alternative of not incorporating the Web into one's business strategy is the riskiest gamble of all.

Alliance leverage. Unlike risk pooling, this strategy involves establishing a portfolio of alliances in many areas. Again, Microsoft's strategy is a good example. No

tling to establish the next generation of technical standards.

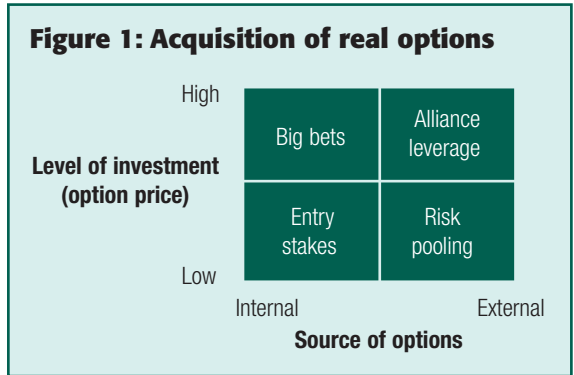
Microsoft has acquired a wide array of options to navigate the uncertainties. Through alliances, it has positioned itself at the intersection of television, the internet and wireless and cable data transmission. Its portfolio of relationships should guarantee it a strong strategic position, no matter how the market shapes up.

3. Structure the organisation to unleash the potential of the digital business

Strategy-making is not enough; success in the digital economy requires fast execution and continuous adaptation – two capabilities that tend to be limited in traditional organisational structures. Businesses must overcome three key challenges if they are to act on this principle.

The first – and biggest – challenge concerns incentives for leadership. Incentives for creating and shepherding digital businesses may be very different from incentives for maintaining or growing traditional businesses. The problem for many companies is not failure to understand the impact of the internet but how best to respond given an organisational structure whose centre of gravity is determined by the old business model. How can they attract the human talent they need to operate in the digital space?

A common strategy is to set up a separate



Internet forces faster pace of evolution in business
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organisation. Software company Lotus, for example, established the Iris Corporation to develop its Notes groupware. Iris's incentive structure was more conducive to the new project than that in the parent corporation, which was preoccupied with its 1-2-3 software. As it became clear that Notes would emerge as a leader in the new category it was creating, Lotus brought it in-house; it was a key factor in the \$3.52bn IBM paid for Lotus in 1995.

Differential incentives are a key element of many companies' digital strategies. Whereas traditional schemes tend to provide remuneration

basis. Or a company might shift its equity ownership from a minority to a majority holding, or even go for outright acquisition.

Examples of these various relationships abound. Sony has licensed Windows CE operating systems while it is pouring millions of dollars into developing its own AperiOS operating system. Intel has invested over \$500m in recent years in more than 50 companies that develop products based on its microchip architecture. Where Intel cannot influence product/market outcomes, it should let the market evolve as it will and make follow-on

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either at fixed levels or tied to the company's earnings, managers in digital business need to be incentivised with rewards for strategic agility and for positioning the company to capture potential future benefits. US bookseller Barnes & Noble is in the midst of creating a separate organisational structure for barnesandnoble.com, in 50-50 partnership with German publisher Bertelsmann.

The second challenge is about information flows. Many organisations are structured to optimise information flows in a way that is consistent with command-and-control logic and calendar-driven decisions; investment committees meet at fixed quarterly or half-yearly intervals to set budgets and make investment decisions. But decision-making in the digital economy is event-driven; decisions need to be supported by information flows that allow empowered decision-makers to assess a situation and act quickly. In "internet time", managers cannot wait for the scheduled investment meeting to give them the go-ahead to act.

It is arguable that inefficient transmission of information between internet service provider CompuServe and its parent company, H&R Block, contributed to CompuServe's being overtaken by AOL in the market that it pioneered. Similarly, Encyclopedia Britannica was slow to capitalise on the internet revolution and is now in fierce competition with Microsoft's Encarta product. Again, a possible solution is to spin off the digital business – while retaining an equity stake – to facilitate information flow and quick decision-making (as H&R Block did with CompuServe in 1996).

The third challenge concerns external relationships. Successful strategy in the digital arena requires a business to establish and manage a dynamic portfolio of relationships. The ability to restructure contracts and business agreements with external parties – including, sometimes, competitors – is a key requirement. For example, as broad developments become apparent, it might be necessary to move from licensing a technology on a non-exclusive basis to licensing it on an exclusive

investments only when they favour Intel's market leadership. Microsoft is continually adapting its portfolio of alliances in response to external and internal changes.

Business relationships can quickly become outdated. In 1997, Yahoo! made an agreement with Netscape whereby it would pay a fee for the use of Netscape's brand name over 24 months. At the time, Yahoo! was primarily a search engine and Netscape an innovator of browser software. However, by May 1998, Netscape was also positioning itself as a major portal, which clearly conflicted with Yahoo!'s interests. Yahoo! announced that it would terminate the relationship, and would have done so had not the AOL/Netscape merger automatically put an end to it (AOL being a long-standing competitor of Yahoo!).

Strategy as disciplined exploration

Some people may be tempted to view the digital economy as incomprehensibly chaotic and hopelessly risky. Others may not go so far, but still view it as the preserve of new entrants rather than established players.

We believe there is no need for such pessimism, provided managers in both traditional players and new entrants embrace a new strategic approach to the digital economy. Traditional methods of formulating strategy, perfected during the "steady-state" postwar industrial era, are limiting and inadequate. Instead, managers need to see strategy as a process of exploration, disciplined by the three principles outlined above. We use the metaphor of exploration because we feel that it captures the uncertainties confronting companies in the digital economy.

When managers are first confronted with the concept of real options, they tend to shy away, thinking that they need a PhD in maths to understand the analytic intricacies. This is unfortunate, since we believe that the key task for managers is to grasp the logic of real options from a strategic management perspective; the analytic complexities

Trading up on raw ideas
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IMAGE: CORBIS



– which could increasingly be handled by software and supporting systems – are less important.

A question that always comes up is how to find the resources required to pursue manifold strategic opportunities. An important aspect of real options thinking is the recognition that both internal and external resources can be deployed to build options. Recent innovations in financial markets have facilitated comparisons between risks that were traditionally thought to be internal to the company with those whose prices were determined in security markets.

For example, international telecommunications prices have traditionally been based on carriers' internal costs. Over the past two years, however, new markets have emerged in which bandwidth is

particular niche, companies must look for value in some other capability; if a market is not there, then creating one represents an opportunity for the market-maker.

Success is not just about creating an attractive website, or identifying a new way of delivering value to customers, or moving traditional business operations to a digital platform. Companies in the digital economy will succeed by maximising their opportunities and having the agility to respond quickly to developments. Instead of obtaining tangible capabilities through mergers, capabilities should be built through a portfolio of real options. Opportunities can be understood by continuously assessing the value potential within the portfolio. The discipline of financial markets needs to be

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traded in spot and forward markets (see, for example, www.band-X.com). New investments in telecommunications infrastructure are disciplined by these new markets, which also offer valuable market-making opportunities. Data storage, processing power (measured in "mips" – millions of instructions per second) and transaction processing may provide opportunities for market-makers in the digital economy.

More and more products and processes are becoming commoditised and traded in spot markets. This forces companies to discipline their investments with respect to market prices rather than internal costs. Once markets emerge for a

combined with an agile organisational architecture.

Our three principles provide an integrated way to meet the digital economy's challenges. Hence it is crucial not to embrace one of the principles to the exclusion of the others – such a piecemeal approach will at best provide an illusion of success. When the three principles are taken together, an organisation wins.

Further reading

Amram, M. and Kulatilaka, N. (1999) *Real Options: Managing Strategic Investments in an Uncertain World*, Boston, MA: Harvard Business School Press.

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**Decisions, decisions:
nothing is certain in
the digital economy**