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Part I

The Dynamics of Innovation

Part I of this book takes an in-depth look at *why* innovation and in turn *how* innovative teams vastly differ from conventional practices and organisations. It outlines the key principles of why and how innovation and innovative teams are so extraordinary in two related chapters.

Chapter 1 – The Unique Nature of Innovation: The premise of this chapter begins with this: If something – anything – is new, you can be sure that you and your peers – no matter how smart, insightful or experienced – are not going to understand it that well. And because of this a different set of management philosophies and principles are needed to negotiate successfully this unique nature of innovation. Furthermore, a great many more innovations are increasing in complexity. They are now made up of vast and diverse systems of ideas, technologies and processes that have to function as one integrated whole. In view of this, Chapter 1 outlines the peculiarities of such complex systems innovation, and the secrets to how such idiosyncrasies not only can be overcome, but used to advantage.

Chapter 2 – The Unique Nurture of Innovative Teams: If a potential complex systems innovation project is managed and organised in the very same way as a mainstream operation, then you can bet the potential innovation in question will remain only a question. But this conclusion has a much deeper consequence inasmuch as it is counterintuitive. It goes against the hardened grain of traditional management style and organisation. Simply put: to move an invention effectively through the various stages of technical conception/development and eventual commercial/public adoption, a particular kind of organisation needs to form – the *innovative team*.

CHAPTER 1

The Unique Nature of Innovation

There is nothing more difficult to carry out, nor more doubtful of success, nor more dangerous to handle; than to initiate a new order of things. MACHIAVELLI

Innovation is a competitive necessity today. Yet this competitive must-do is unlike any business activity I have come to know. It is an enigmatic endeavour that few have mastered. And those who claim to be masters of the dynamics of innovation secretly tell that they are still subject to the same peculiarities of innovation as any novice. Innovation can be, and often is, a cruel venture. It can put out the flame of a budding business in an instant, it can send a giant corporation reeling down the stock market and off the chart (permanently) and of course it can cause confusion and utter distress in already overburdened public services. For it is easier for an innovation to flounder, than to fall off a log. And believe me, my colleagues and I have the wounds to prove it.

But we also have the rewards and esteem that come from the many successes we have had. We do not claim to have mastered all the dynamics of innovation, nor do we profess to have penetrated all the depths of its unique nature. But we have learnt a trick or two on our journey thus far, and I would like to share some of them with you here.

Leading Definitions of Innovation

So what does innovation actually mean? Here are a handful of definitions from leading thinkers in the world of innovation. Cap Gemini Ernst & Young Consulting, Centre for Business Innovation calls innovation:

'The realisation of value from a new solution to a problem, changing the rules of the game.' Jim Utterback, Professor of Management and Engineering at MIT calls it the 'Reduction of an idea for first use or sale'. Colin Clipson, formerly professor of architecture and research, University of Michigan, says it is a 'Commercially successful use of a new solution'. Peter Drucker defines innovation as 'Change that creates a new dimension of performance'. So, in short, technically speaking, the word 'innovation' means the *successful introduction of new ideas*.

However, these definitions are qualitative. Accountants often raise an eyebrow (or two) when they hear such nebulous definitions, often asking for more concrete interpretations. Yet, unless you are talking about one particular innovation, at one particular moment in time, attempting to tie down the quantitative definition of successful innovation to some unified objective measure is an elusive task.

Nevertheless, the most significant measures that have turned up again and again over the years are based around three strategic precepts: exceeding the customer's unsatisfied, unarticulated and/or emerging needs and expectations; creating a new market space; and creating a superior value return:

- *Exceeding the target customer's unsatisfied, unarticulated and/or emerging needs and expectations*: All success, or indeed failure, starts with an expectation, that is, whether an outcome goes the way you anticipate, and so it is with innovation. There is no more important expectation than the customer's expectation that the innovation is meant to satisfy. If the innovation does not at least meet the expectations of the customer, then it is not an innovation. Furthermore, in both the commercial and public domain these days, the goal has become to exceed the customer's emerging or unarticulated needs and expectations – wants and whims that are just beginning to develop or indeed have not yet been identified or served. And don't forget that this is no easy challenge, as all customers now demand top quality levels of service as standard.
- *Reinventing or creating a new market space*: Change in the business world is no longer gradual or continuous. Change today happens in sudden, disruptive leaps that can radically transform the rules of the game. In a discontinuous world, things don't simply happen faster, different things happen faster. Consequently, continuous improvement and efficiency drives no longer provide competitive advantage alone. Innovation is the key not only to keeping one step ahead of the competition, but provides completely new categories of competition.

Innovation is about creating a difference, creating new means over and above old modes. Here, so-called radical, category-breaking innovation, such as brand new business concepts, can create completely new markets, even entire new industries. This is fundamentally about new concepts that create new segments outside traditional markets.

- *Providing superior value return on total investment*: Of course, in the business world this is pivotal. But again, the measure is all to do with expectations. What is deemed a superior return is industry relative, and depends on who is doing the anticipating. Often, expectations are set against historical financial performance of both the company and industry. In the public sector, best value is now a key yardstick for gauging successful innovation. In Chapter 2, I'll give up some of the secrets of how teams can deliver best value innovations.

There are other criterion for success that are important these days, such as safety, ecologically sound, regulatory and legal issues. But all these fit into the three criterion in some way.

What Innovation Is

Beyond the definition of successful innovation, it is important to grasp the deeper nature of innovation. As with all processes, there are peculiarities here that must be mastered if successful innovation is going to take place.

The starting point to determine the specific nature of innovation is that it is a *deviation from the norm* – whether in business, technology or social systems. And that means getting away from conventional practice and wisdom. And when you are in such *terra incognita*, you are in a world of novelties, uniqueness, original things and often the downright strange and complex. Such novelties can occur in everything from new products to processes to new business platforms; to popular culture, the arts and sciences; and in modern day social systems and institutions. Innovation touches all.

Embedded in innovation's unique nature are various underlying dynamics and distinctive traits:

- *Uncertain*: Anything new, we do not know that well, and if we do not know something that well, we are unable to predict its behaviour and how it will interact with the real world before output. Furthermore, the inputs of any given innovation cannot be predicted accurately

either. What resources are needed, the timing and the length of use are at best ambiguous. Together, uncertainty in inputs and outputs makes innovation the most unpredictable, tricky endeavour an organisation can take on.

- *Risky*: Risk is related to uncertainty, but it is quite different. Risk is about attaching probabilities to a predicated outcome; where uncertainty is more to do with going beyond what we know. One of the major associated risks with innovation, such as a new product or service, is that once the investment has been made there is little or no residual value left, until the innovation is launched into the market and reaches the financial breakeven point. For many financial institutions, this 'absence of residual value after investment' is too much of a risk, and the number one reason why many fiscal institutions won't pursue radical innovation.
- *Stressful*: Because innovation is uncertain and risky, it is certainly not for the faint-hearted. It takes grit and determination to innovate – anything. Unless you are lucky, innovation is a toil of sweat and tears. Beyond the visceral stresses are the emotional and psychological stresses. Because when we are acting in unknown territory, we are at our most vulnerable. As I'll explain in Chapter 3, when we're working in the unknown, the oldest primitive emotions and reflexes start to kick in, to a point where, for some, changes in behaviour and interactions can be quite dramatic.
- *Intellectually taxing*: One of the most challenging elements of innovation is the solving of problems that have not existed before, because, for the most part, there is *no* pool of knowledge or experience in the areas of breakthrough that innovators can draw upon. Innovators have to be both intuitive and analytical in their creative endeavours.

What Innovation Is Not

It is also worth describing what innovation is not, because many managers and professionals mistakenly force conventional practices on innovation activities, which actually only impedes progress:

- *Not a repeatable process*: Indeed, there will be transferable knowledge and processes that can be used the next time around. But, for the most part, an innovation, particularly rule-breaking innovation that contains

many radical ideas, will require unique ways and means to bring it to market. Again, this means novelty and uncertainty.

- *Not a linear process*: The activity of innovation is not like a sausage machine, where you input some information and materials and out comes a new computer chip or fast-food brand. It simply doesn't work like that. In fact, in the manufacturing world, the standard way to bring new ideas to market is to follow a so-called project life-cycle model, a serial, step-by-step process (sausage machine). But most manufacturing companies find it almost impossible to bring new products and services to market on time, budget and specification; and many run three or fourfold over plan. This is partly due to innovation's habit of morphing, at the drop of a hat, from something that we thought we knew well into something that we don't understand. Solutions to problems don't arrive in any particular order, don't turn up when we expect them to, or behave as we predict. The point is that innovation is a non-linear activity, and it's best to use a system – such as high performance innovative teams – to manage such non-linearity.
- *Not efficient*: The number of times executives have asked me to make their innovation activities more efficient I could count on the stars above. Because innovation is a non-linear activity full of novelties, uncertainties, risk and so on, it is just not possible to make the activity efficient. In fact, the late Akio Morita, co-founder of SONY, often said that the best innovations appear out of a process that looks something like a demolition derby.
- *Not driven by common sense*: At one level, common sense is the application of experience and knowledge that worked well in the past. But what of innovation, where there is no bank of cumulative knowledge? Again, innovators have to invent solutions as they go. But more than that, many of the solutions to new kinds of problem fly in the face of conventional wisdom, because the problems themselves are unique and original. For innovation, common sense may be the worst teacher in town.

What Successful Innovation Can Be

Paradoxically, despite what innovation is and what it is not, teams can bring in an innovation with high levels of operational performance:

- *Productive*: Productivity is not the same as efficiency – an all too common misunderstanding. Productivity is quite different to efficiency in that you can be quite inefficient, but have high levels of output and results over time. My office, for example, is not an efficient place, it looks like a playground, full of gadgets, tools and toys, new product concepts, seminar scripts, training programmes and schedules. But I put these out at a rate of knots, because of the very fact that my office is set up for so-called non-linear activities. Later, in Chapter 8, on high performance goals and metrics, I'll explain how to build teams that are highly productive under such chaos.
- *High speed*: Rapid innovation cycle-times are now a competitive entry requirement. That is, what used to take years to develop is now often brought to market in a matter of a few months. As noted above, innovation teams are set up for the non-linear nature of innovation, and therefore are the best organisational unit to deliver quick innovation cycles.
- *Leaner operational expenses*: High levels of productivity and speed dramatically reduce operational expenses. Futhermore, innovation teams are leaner (as you will see in Chapter 9), again reducing costs.
- *Higher product/service performance*: This is how well a new service or product conforms to the intended technical and market specifications. Again the interactivity of innovative teams enables better design solutions to meet such challenges.
- *Leaner product/service costs*: Because design solutions often achieve improved performance, the actual build cost of a product or service innovation is often reduced. This also goes hand in hand with high productivity and speed.

Failed Invention and Deep Uncertainty

As touched on in the Introduction to this book, most inventions fail to make it to innovation, most ideas don't make it successfully to market and are never heard of again. There are umpteen reasons why innovations fail, but in the end, the reason why most innovations fail is that teams do not understand the magnitude of the task at hand. Therefore, one of the most important issues to address is to define the type of animal a team is dealing with. And the best way to do that, I have found, is to define an innovation in terms of uncertainty. Once the uncertainty factors have been defined for a given innovation, a team can begin to understand how far they are going

beyond cumulative experience and knowledge, and in turn begin to get a feel for the magnitude of the risks and issues they will face.

But you may ask: How much uncertainty does an innovation contain? How do you define the uncertainties? How do you then measure these uncertainties? These are substantial and important questions.

The most general definition of uncertainty I've developed thus far goes by how much *novelty* and *complexity* a given innovation exhibits. Yet this general definition turns out to be a powerful tool for determining and managing uncertainty within innovation projects.

The degree of novelty (newness) and complexity (diversity of ideas) embedded within any particular invention sets the level of uncertainty. In short, the higher the degrees of novelty and complexity, the higher the degree of uncertainty.

Novelty can appear in many guises, from new technologies, to new processes, to unique market introductions, even novelties in cost. For example, Southwest Airline's innovative strategy to develop the lowest cost structure in its industry has given it best-in-class net income and growth. Its no frills, almost austere service system has given major competitive advantages, enabling Southwest to operate at two to three times the gross margin of its nearest three competitors (Standard & Poor).

Complexity is represented in terms of the diversity of ideas, and can appear in forms such as the number, sophistication and resolution of core technologies, to the performance of the innovation such as reliability, durability, finish, level of service and so on. For example, a television in the 1970s had a six-month mean time between failure (MTBF), with of course backup by a not so keen maintenance crew. In the 1980s, this went up to three years, and by the turn of the millennium, five years was the standard MTBF for the TV.

Innovation Uncertainty Matrix

Innovation uncertainty is best viewed in the form of a two by two quarter (Q) matrix, showing complexity along the X-axis and novelty along the Y-axis. The further one goes along each axis, the greater the uncertainty becomes (Figure 1.1).

There are, of course, many ways to define a given innovation, and indeed many systems of categorisation. In this case, each quarter (Q) box of the matrix has four very different categories of innovation, represented by different levels of novelty and complexity and therefore uncertainty:

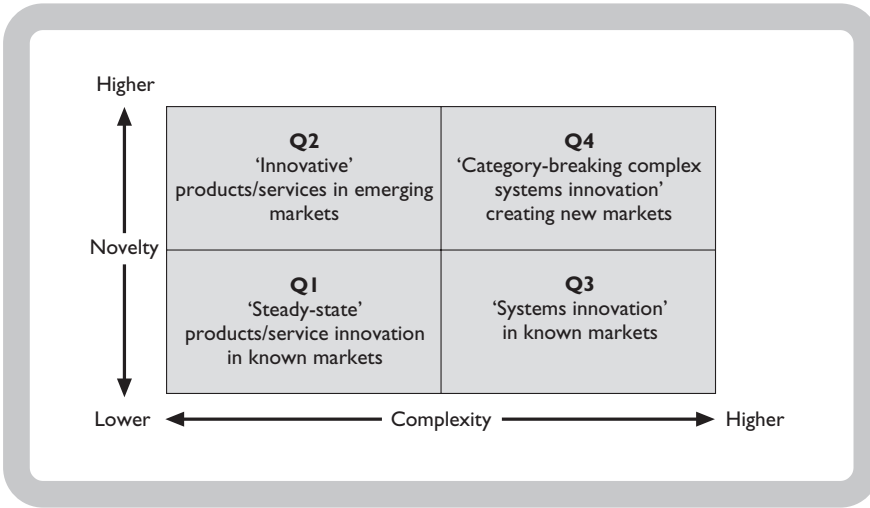

Figure 1.1 Innovation uncertainty matrix

- *Q1 – new steady-state products/services* in known and well-defined market segments. This category is the least uncertain, and in turn least risky. Examples would include: office equipment such as lighting, seating and carpeting; fashion items such as off-the-shelf sports shoes; popular music such as yet another rock album. These are standard commodities with little or no novelty and lower levels of complexity in terms of core technology and processes and/or market distribution and communications.
- *Q2 – innovative products/services* in new or emerging markets. Examples would include; the geographic introduction of AppleCola into China; a brand extension such as a Cadbury's Coffee Shop; even a new domestic appliance such as a bath overflow alarm. Novelty may appear in the form of core technology or market logistics and communications. Complexity, however, would be lower in terms of the number and sophistication of the technology.
- *Q3 – systems innovation* in known and well-defined markets. One example might be a new palmtop personal computing device. Such an innovation might stimulate new demand in a saturated market, or change the competitive context of established markets. Novelty would be lower in terms of the market communication and technology, but higher in terms of the technical complexity.

- *Q4 – radical category-breaking systems innovation* creating new/emerging markets/industries. Examples include in-flight entertainment systems, or a radically new concept for a fast-food outfit. Such radical category-breaking systems innovations often create entirely new markets, even industries. Everything from the core technology to the market communications and distribution need to be constructed. This is by far the most uncertain, risky and chancy innovation an organisation can take on. Expect high uncertainty, basic blunders, acts of nature and booby traps on the road and in the market if your innovation fits in this category.

And so, a rule of thumb for innovation: the more novelty and/or complexity an innovation exhibits, the more uncertain an innovation becomes, and, in turn, the more challenging and risky an innovation is. Clearly the uncertainty an innovation exhibits has significant impact on the potential success for a given innovation.

Successful Innovation and Accelerated Learning

So, what to do? Clearly, teams need a way of driving out uncertainty within given innovation projects, in the least possible time, and with the least contingent effort. What drives out such uncertainty is accelerated real-world learning and cumulative knowledge. Essentially, the faster the rate of learning occurs, the faster the rate of feedback for adaptation, the faster uncertainty drops.

As noted in the Introduction to this book, most innovations fail. But that's not all bad news! Tom Peters says the essence and engine of innovation is failure, because it is in failure where we learn most. Failure, then, is part of the culture and nature of innovation. The quicker you trip, the faster you push your innovation to its limits, the more learned about a given innovation you're going to be. As the late Soichiro Honda, co-founder of the Honda Motor Co., often said: 'My success comes from ninety-nine percent failure and introspection.' He lived by the belief that a failed innovation can tell you what direction to go next, or how a design could be improved. Furthermore, if you don't sometimes or ever have that naive feeling, that feeling of slight stupidity and of being out of place, then you will never learn. Again, it is when we experience that feeling of naivety, that we are learning most.

Clearly, there is a need to apply the most effective methods to drive out uncertainty in the least time. Here are some principles that do just that:

- *Portfolio of diverse experiments*: There is a principle in innovation that asserts that the potential future success of your organisation is directly proportional to the number and diversity of new experiments taking place. Therefore, how intense and assorted is your experimental innovation programme? A few kick-starts in the pipeline? Or a rich zoo of experiments? Remember, most inventions fail to become innovations. So uniqueness and novelty in experiments are key here.
- *Accelerate learning before output*: The primary objective for any experiment is to effect high levels of understanding about how an invention (physical equipment or people-based services) behaves in its working environment before launch (output). This is all the more important today, as more innovations contain so-called 'disruptive technologies and processes' that are not very well understood. In too many cases, this kind of learning is achieved after a new product/service is launched. For large-scale projects (for example aerospace, automotive, internet banking and so on), this causes acute learning disability and is the number one reason why we see quite poor performance in many large-scale projects.
- *Real-world learning*: Make sure that the applied rules promote learning with real prototypes, in real markets, with real customers. Prototype experiments are also essential to risk management in any innovation process, because learning is the single most effective way to derisk – anything. Furthermore, prototyping is the single most significant activity within innovation, in terms of the value-adding information it gives up. So centre the learning around the customers and providers who will purchase, use, abuse, transport, make, serve, maintain, and recycle the contraption. Too many firms ignore the customer when experimenting with prototypes. At the end of the day, it's the customer who is both the judge and jury. The message here is to get the prototype into the market, today.
- *Experiment differently than the competition*: To create new value, you must innovate in ways the competition are not or cannot. To maintain differentiation from the competition, there is a vital need to enrich with radical ideas and learning experiments. The bottom line here is that to truly innovate, you must not only learn faster and better than the competition, you must learn different things than the competition.
- *Quantitative performance measures*: Performance targets must be identified, and the tests to qualify those targets must be defined. These include such measures as component technical characteristics

performance, process characteristics performance and end-process controls performance. Equally, operational and field performance and test criteria now come from an increasing number of international technical and safety qualification standards. These give a baseline for performance, that is, they set the minimum performance requirement. In many situations, it's important to exceed these standards to achieve competitive performance advantage.

- *Get-out strategy*: Don't get stuck on a single idea. Innovation is also a game of probabilities. You need to play the numbers. To do this you must define the minimum technical and market performance that you must meet for the innovation to be successful. After several failed attempts to reach the performance targets, you must be prepared to walk away. Furthermore, as noted above, a key to derisking a project is to fail quickly. The earlier you fail, the faster you derisk and/or learn. As James Dyson says: 'If it works, and especially if it works first time, you learn nothing!' So, treat all prototype failures as learning experiments.

Any innovation that contains significant amounts of novelty and/or complexity will have elevated levels of uncertainty. Learning is route number one to driving out such uncertainty, and in turn levelling risk and increasing the chance for a successful outcome. The above guidelines will accelerate learning and are a major set of application ideas that any innovation team can use to make successful innovation happen.

(NB: The main points of this chapter are outlined in Exercise 1 in Appendix A in an easy-to-learn team-building format.)

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