# Hands-On Systematic Innovation

for Business and Management

IFR Press

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**Library of Congress Cataloging-in-Publication Data**
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Hands-On Systematic Innovation for Business & Management
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ISBN

Printed in Malaysia.

$F^2$

# Warning I

*"The best models are as simple as possible.*
*But no simpler."*
Albert Einstein

This is not a typical 'management' book. It is a book built on ideas distilled from areas of human endeavour beyond the traditional management sciences. Going beyond traditional boundaries means venturing outside zones of comfort. It also means we need to think about whether the journey might be worth the effort.

Time is a precious commodity for any manager. Lack of time is one of the things that encourages us to stay within our own comfort zones.

We think the ability to innovate systematically – to genuinely and reliably be able to generate successful innovations that will make a positive difference to the bottom-line of a company – is worth the time to dip a toe or two into the contents. We have structured the book on this basis.

Nevertheless, we assume that those time pressures and comfort zones may cause some to end their interest in the book right here.

# Warning II

*“Here be dragons.”*
Footnote on ancient maps.

This book assumes that readers already recognise the importance of creativity and innovation. It does not try to justify why anyone should be creative, nor why any organisation needs to be innovative. If you don’t know why innovation is important then you don’t need this book. Yet.

# Warning III

*'We don't see things as they are, we see them as we are'*
*Anais Nin*

This book is a companion to the technical version of the systematic innovation story. That book was configured for engineers, scientists and designers. This one is configured for managers and leaders.

Clearly, in our highly segmented and specialised world there is a need to separate the technical from the non-technical. Clearly also, in the large majority of organisations, the separation between 'technical' and 'business' is almost complete. This is unfortunate. Very often we see that the best solution to a technical problem is a business one. Similarly, very often the best solution to a business problem is a technical one. In the real world, there is no separation between technical and business – they are simply two aspects of a unified whole.

In the future, we hope that it will be possible to combine the two disciplines into one coherent whole. For now, we have assumed that it is still necessary to separate the two sides. This book consequently requires no knowledge of science, engineering, mathematics or anything that managers and business people might describe as 'technical'.

# Warning IV

*"The average man would rather face death or torture than think."*
Bertrand Russell

This warning is only for those readers that know about TRIZ. If you have never heard of TRIZ, you can skip to the next section. Finding out that this book is built on some TRIZ ideas and that TRIZ was a product of the former Soviet Union and built on the study of technical patents can only look like, a big pair of negatives from a business standpoint, so best to ignore both.

People familiar with TRIZ, of course, will have at least an inkling that it can be applied to business situations. For those people, the health warning is that we have strayed – sometimes considerably – from the traditional versions of TRIZ. It is very difficult to convince a busy, stressed manager that applying a simple one word Inventive Principle is the solution to his or her problem. Business problems involve people. People are fuzzy, inconsistent and often downright awkward. In a word, people are complex. The tools and methods we present here seek to take into account that complexity. Every complex problem can be solved by a simple solution. Just not very well. Our aim here is to provide means of generating real and effective solutions; where we see TRIZ fails, we have developed new tools.

# Foreword

*"When you have discovered the mountain, the first miracle that will appear is this. A most vehement and very great wind, that will shake the mountain and shatter the rocks to pieces. You shall be encountered also by lions and demons and other terrible beasts, but fear not any of these things. Be resolute and take heed that you return not, for… after all these things and near the daybreak there shall be a great calm, and you shall see the Day-Star arise and the dawning will appear, and you shall perceive a great treasure. The chiefest thing in it, and the most perfect, is a certain exalted tincture with which the world… might be tinged and turned into most pure gold."*
*Eugenius Philalethes, Lumen de Lumine, 1651.*

*or*

*"are we nearly there yet?"*
Well known human evolution cartoon.

Some time in 1998, we sat down and wrote out a list of the books we would like to read on TRIZ. Top of that list was a 'good' book to help apply TRIZ in technical applications. Second was one on business and management applications. While it is too early to say whether our previous book, 'Hands-On Systematic Innovation', qualifies for the 'good' description in the first case, it was decided that the growing interest in the second meant that it was necessary to proceed with trying to meet the need in any event. And so 'write book on business application of TRIZ' was duly added to the collective job catalogue. Friends, partners and all those around us no doubt groaned in anticipation of the late nights, and all around grumpy behaviour that would inevitably follow.

The book that you see before you is the end result. To our surprise, however, this time, although the late nights certainly came true, the grumpiness didn't. I'm not sure I have ever seen the process of writing 'pleasurable', but that is certainly the way it has felt for all but a tiny number of the chapters in this book (I'll leave it to you to guess which ones!). Part of the reason for this is that all the hard work trying to work out theme and structure has carried across almost directly from the first book. The other part is the combined feeling that we are doing something that hasn't been done before, and the knowledge – based on our ever expanding list of clients in the business and management sector – that what we're describing actually works.

With respect to this second point, although we have spent time working in industry and have been responsible for strategies, budgets and people the size and breadth of small towns, we have never considered ourselves to be 'management consultants'. In the same breath, we find the description both overwhelming and profoundly depressing. Overwhelming, because during the course of distilling best practice for some of the Systematic Innovation principles described in the book, we have found ourselves in the company of some truly great thinkers, for whom the Wayne's World originated exhortation 'we're not worthy' springs instantly to mind. Profoundly depressing because our own personal experiences with 'management consultants' has been almost without exception frustrating and a to a very large extent a waste of our time. Put simply, it seems to us that a very large proportion of it is boundary-condition-ignoring, fashion-following, 'here's one I did earlier, no need to think, just do it' corporate dogma. In any event, it all seemed to be

saying things that were almost the opposite of what we know to be the important philosophical constructs of what we now refer to as Systematic Innovation. Whether these turn out to be 'right' of course is a matter of some debate. Our money is on the fact that they are (they work literally everywhere else – including that biggest system of all 'nature' – so why not here?). You, as the reader – provided you got past the raft of health warnings that appeared before you even arrived at this Foreword – have a similar choice to make.

With regard to theme and structure, things have changed little from the companion 'technical' book. The theme, in fact, is almost identical – starting from a focus on benefits rather than features, and going on to recognize that it's not just the 'what' of Systematic Innovation but the 'how' and 'why' that are necessary to properly communicate the subject matter. Related to this theme and the consequent need for the tools, methods and strategies being discussed to be applicable to any problem or opportunity situation we may care to throw at them, it is also worth noting that where the TRIZ philosophy which formed a significant part of the foundation contained holes (and although it is undoubtedly the most comprehensive creativity and innovation system in existence, it undoubtedly does contain holes at this point in time), we have sought to plug them with the best alternatives we could find.

In terms of structure, a cursory glance at the chapter listing for this book and the previous technical book will show there to be almost no difference. What that means in the context of this book, is that things are arranged in such a way that after four general introductory chapters describing the overall Systematic Innovation picture, the book is arranged such that there is a different chapter for each of the definition, selection, solution or evaluation tools and that things will be read on an 'as required' basis.

The most significant variations in structure involve the shifting balance between overview and detailed process. One of the golden rules of management texts (based on the analysis of several hundred during the process of distilling best practice) seems to be 75,000 words is about what is expected – too many more and 'busy' managers will never have the will to pick it up; too many less and it obviously can't be serious. The technical book was over 150,000 words because that's how much content we felt there needed to be to adequately communicate the message. Here we have slightly more. The best way to think about this potentially daunting number is that there is around 30,000 words (or half of a trans-Atlantic plane journey) worth of 'reading matter', and another 140,000 worth of how-to for when you get back to the office, and, if we've done anything like a half decent job, you want to get your hands dirty and actually use Systematic Innovation to make a difference.

Darrell Mann
Clevedon,
April 2004.

# Contents

# 1.
# Introduction

*"Ours is not so much an age of vulgarity as of vulgarization; everything is tampered with or touched up, or adulterated or watered down, in an effort to make it palatable, in an effort to make it pay."*
Louis Kronenberger

*and*

*"Whether you believe you can, or whether you believe you can't, you're absolutely right."*
Henry Ford

There are approximately 1800 management texts published every year. 1800 and rising. Whichever way you look at it, that is a large number. The choice of titles is almost as overwhelming as the variation in quality. As a consequence, very often the decision to purchase a given book veers towards 'random'. But then what is the alternative? No-one – least of all a busy manager – has the time to look at even a fraction of what is available.

This lack of time versus quantity of information conflict is the basic dilemma central to the theme of this book. The subject matter of the book is systematic innovation. The foundations of the methods we will describe go back to 1946, when someone sat down and thought wouldn't it be great if we could analyse successful solutions from every area of human endeavour and distill the results into a form that would be useful to individuals irrespective of which are they were working. What if, we thought to ourselves back in the mid 1990s when we started applying the systematic innovation techniques to business situations, what if we could distill all of the useful stuff from those 1800 management texts per year and present the results in a coherent and integrated manner.

It is our belief that we have now done exactly that. We realize that that might sound rather difficult to believe. 1800 books per year – not to mention all of the other sources of learned business knowledge – is a considerable number to have to analyse. Plus, who on earth are we to determine what is 'successful' and what is not? In many respect we are in exactly the same position as the original 1946 researchers. Except they were looking at patents rather than business texts. When we look at patents, that 1800 number looks like an even more overwhelming 200,000 per year. However, two important things happen when you start looking at mankind's inventive capabilities. The first thing you discover is that there is an awful lot of low quality stuff out there. Typically, when we are looking at patents, we are able to reject over 90% almost immediately since they contribute nothing to the furtherance of human knowledge. The second thing you discover is that there is an awful lot of re-inventing the wheel takes place. Different industries and disciplines tend not to communicate with one another, and consequently, they all devote sometimes massive resources to solving what turn out to be problems that someone in a completely different field already solved. In part this happens because we all have a tendency to think that our problems and situations are unique. Well, of course, in many ways they are. But in many other ways they absolutely are not. After you have examined close to three million examples of successful innovation, you begin to see that there are some very definite patterns, strategies and techniques that emerge time and time again across disciplines

that appear to be at completely different ends of a spectrum. How could it possibly be, for example, that aircraft designers, teachers, computer scientists, chemical process engineers, and (to take a very broad extreme) termites are all working on the 'same problems'? And – even more surprising – using the same inventive strategies to derive successful solutions.

Yet this is what the systematic innovation research has uncovered. The findings when we look at what managers, strategists and business leaders do when they are successful are remarkably similar to what those same aircraft designers, teachers, computer scientists, chemical engineers and even termites have done. Likewise, the findings show us that a very high proportion of management texts and management solutions have little or nothing to contribute to the furtherance of knowledge. There are an awful lot of bad management textbooks in the same way that there are an awful lot of bad patents.

In effect what the systematic innovation research – now running at several thousand person years of effort – has done is to define a knowledge framework based on success. According to us that framework is 'universal'. Recognising that such a statement can be quite inflammatory, especially to those of an academic persuasion, let us qualify it by saying that it has applied so far to everything that is currently known. What is 'currently known' and what is 'knowable, but not yet known' are two different things. Every day that we continue to extend the method – and currently the family of full-time researchers numbers over 30 – we are constantly testing the bounds of that framework. Every day we try to disprove the framework. Occasionally we find things that cause us to extend or modify it – not, as it happens, in the last two years of activity – but 'occasionally'. One day we might even succeed in showing that it is the wrong framework, but at this point in time we have failed in our attempts to do that.

So, what you will find in this book is a description of this framework, and the tools that emerge from it to help us to solve problems and create opportunities in a systematically reproducible way. The remainder of this chapter is divided into four main sections. In the first of these sections we take a helicopter ride high over the whole systematic innovation terrain in order to present a 'big picture' overview. The aim of this section is to provide a means of seeing the whole thing in the smallest space possible in order to act as a navigation aid later on.

In the second section we examine what is meant by 'success' and 'successful solutions'. Here the aim is to show what we mean when we say that there are an awful lot of bad management texts. Specifically within this section we will examine a series of tests that we will routinely apply whenever we are considering whether a solution we find is one that has something to contribute to the advancement of the management discipline or not.

In the third section we look at the important issue of context. Context is the thing that transforms knowledge into wisdom. Too many management texts fall into our 'low quality' category because they recommend strategies that, although they applied in the context being used by the author, they may well not apply in yours. In this section we will examine different innovation contexts in order to begin to make sense of the who, when and where parts of the story.

Finally, in the fourth section we briefly explore some of the time implications of learning the systematic innovation tools. The toolkit is the result of the biggest study of creativity and innovation ever conducted, and consequently to learn every part of the toolkit is going to take some months to achieve. Very few managers have a 'few hours' never mind a 'few months' to devote to learning new things, hence we spend our time in this section

examining what we can do to get the maximum innovation benefit from the minimum investment of time.

In putting together the specification for this book, we set ourselves some interesting challenges. We wanted a book that focused on benefits (i.e. that it enabled the reader to successfully tackle any problem or opportunity situation they were working on), rather than being just another collection of features. We also decided we wanted a book that could be read from start to finish, or could use as a quick-dip reference; and we wanted it to be both academically rigorous and at the same time not the crushingly dull experience most academic books tend to be. In other words, we identified a number of contradictory requirements and decided we wanted to avoid compromising on any of them. How successful we have been remains to be seen.

In keeping with all of the above aims, the book has been structured and sequenced in such a way that anyone working on a problem (in the most general terms that word implies) could begin at the beginning of the book and be taken on a journey through only those chapters necessary to solve the problem.

The main method of achieving this feat of navigation is the small figure appearing at the top right hand corner of each page of the book. A larger version of that figure is shown in Figure 1.1 below.

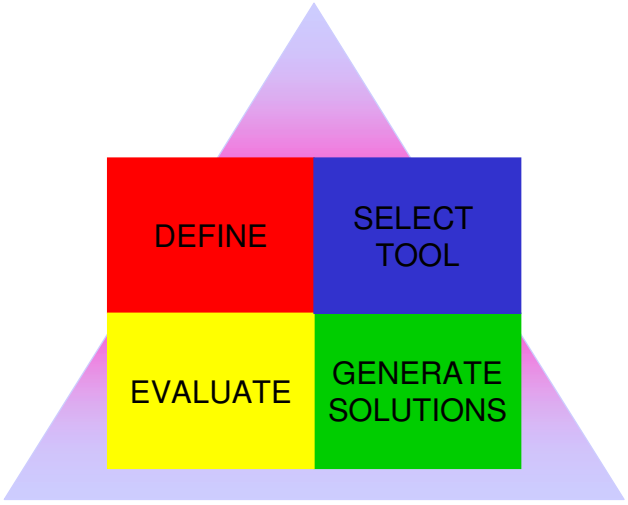


**Figure 1.1 Hands-On Systematic Innovation Navigation Aid**

Three of the four steps contained in the box at the center of the figure are like any generic problem definition and solving process; it being necessary to define what the problem is, to generate some solutions and to then evaluate those solutions. We add in a fourth step – 'select tool' because of the richness and breadth of the problem solving tools available to us through all of the tools, techniques and methods we have found it necessary to include. We examine this four-step process in more detail in the next chapter, and follow this by a chapter on each of the elements of each box in turn. As you will see there, some of the boxes – most notably the problem definition and generate solutions boxes – contain a host of other boxes.

The aim of this section is to discuss the triangle drawn behind the four boxes (hence the reason the top right hand corner of this page emphasizes the triangle to indicate that this is what we're talking about at this point in the book). The triangle is there to denote the existence of an underlying philosophy behind the process being discussed in future chapters.

If you're already familiar with systematic innovation and its application in a business or management context, you may wish to delve straight into the other Chapters. If you're not, we recommend that you read this chapter and the following two – 'process overview' and 'psychology' in order to obtain the maximum benefit from subsequent chapters.

## 1) Systematic Innovation – Helicopter View

As illustrated in Figure 1.2, systematic innovation can be thought of on three basic levels. At the first level it is a collection of tools. These tools can be used individually, or they can be coupled together to form a comprehensive start-to-finish method. The basic idea behind this method is that it will take us through a systematic procedure that will progressively help us to define what our situation is and what we should do to improve it, until we reach a point where we have a 'best' solution to the situation we have defined. Beyond that, then, is a third level on which systematic innovation works. We have labeled this third level 'philosophy'. 'Philosophy' perhaps sounds like a very grand word. What we mean when we use the term is that there are high level concepts and ideas that should influence how we utilize the method and tools.


**Figure 1.2: Hierarchical View of Systematic Innovation**

Our main emphasis for the remainder of this chapter is to focus on those philosophical elements. Before doing that, however, it is worth setting the scene for them by reviewing some of the main findings of the systematic innovation research. These are:-

- that there are only a small number of fundamentally different types of problem
- that someone, somewhere, therefore, has already solved a problem something like the one you wish to solve
- that there are only a small number of possible strategies for generating inventive solutions
- that system evolution trends are highly predictable
- that the strongest solutions transform the unwanted or harmful elements of a system into useful resources.
- that the strongest solutions also actively seek out and destroy the conflicts and trade-offs most design practices assume to be fundamental.

In allowing us access to these findings, systematic innovation has incorporated the knowledge and experiences of the world's finest inventive minds. It effectively strips away all boundaries between different business disciplines.

The tools can be used in a number of different ways. The overall process enables users to systematically define and then solve any given problem or opportunity situation. Some users will rigorously apply this process. Others are happier extracting individual elements from the overall structure and using those. This book has been configured in such a way as to allow users significant flexibility, offering both an over-riding structure and access to individual problem definition and solving tools. An over-riding aim of the book has been to construct a problem definition and solving process that works for any situation users may care to throw at it – whether that be technical or business, simple or complex, highly constrained or clean-sheet, step change innovation or incremental improvement, or focused on products, processes or services. In that sense, even though we focus here on business and management issues, it is worth noting that the basic philosophy, method and toolkit is conceptually almost identical to the companion technical version of the book.

Systematic innovation is both simple and complex. To learn and gather a working knowledge of the whole structure will probably take several months. Some people are prepared to make this investment, and others are not. Those that are not usually take great comfort from the fact that they will be able to learn and realise significant benefit from just a short exposure to individual elements of the overall structure. In many instances these benefits are enough. We've tried to design the book to suit every individual requirement. The basic idea here is that the process and tools should, as far as possible, adapt to your way of working and your requirements, rather than the other way around. One thing that is clear, however, is that it is not a 'creativity replacement' kit. It absolutely demands our creative input in order to get the best out of it. Best to think of the whole as a creativity turbo-charger. A turbocharger is a great power booster, but is useless without the engine.

Systematic innovation is different to most other creativity aids, and may appear a little unnatural at first. Here are some of the high-level philosophical elements that we hope will to guide your overall perception and use of the method and tools:

Firstly regarding the big idea that 'someone, somewhere already solved your problem' is the by which problem solvers become able to access the good solutions obtained by the world's finest creative business minds. The basic process by which this occurs is illustrated in Figure 1.3 below.

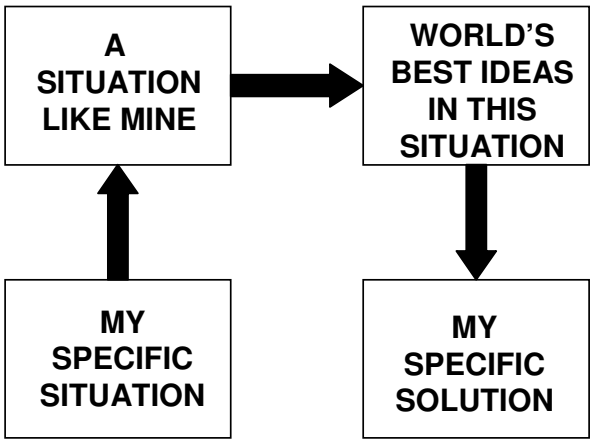


**Figure 1.3: Systematic Innovation Abstraction Philosophy**

Essentially, the systematic innovation researchers have encapsulated the principles of good practice and set them into a generic problem-solving framework. The task of problem definers and problem solvers using the large majority of the systematic innovation tools thus becomes one in which they have to map their specific problems and solutions to and from this generic framework. The main tasks here are, first of all being able to abstract your situation in such a way that it begins to look like a situation that someone else has already generated solutions for, and then secondly, transforming the generalized solutions into things specifically relevant to your context.

**Seven Pillars**

Beyond the abstraction requirement, there are seven other philosophical pillars upon which the systematic innovation framework rests. These pillars are illustrated in Figure 1.4.

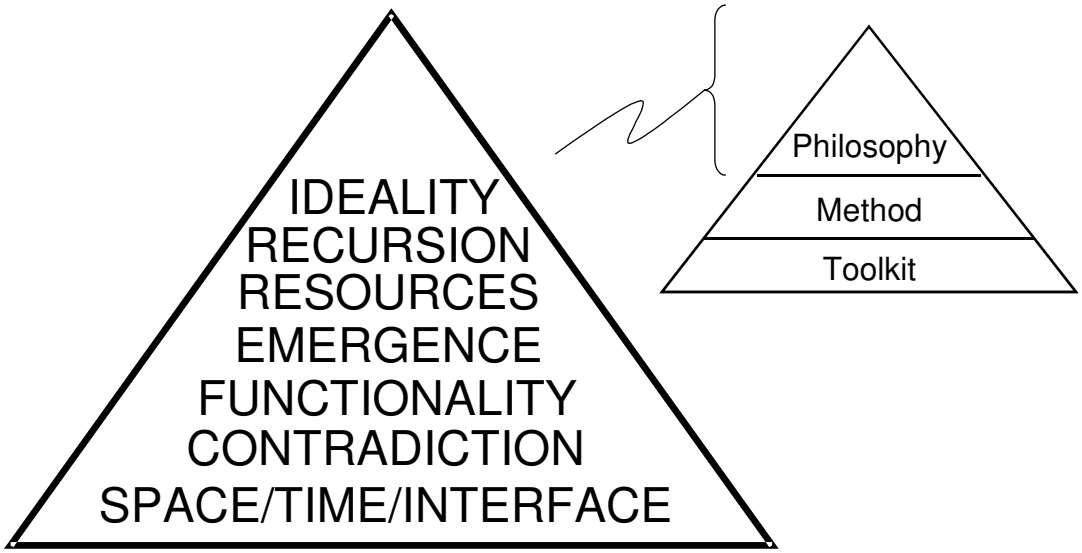


**Figure 1.4: Systematic Innovation Pillars**

Let us now look at each of these seven pillars in turn in order to examine the influence they should exert on the way in which we deploy the systematic innovation tools and processes. Thus, in no particular order, we have:-

**Ideality**

One of the first tests of a successful innovation uncovered by systematic innovation researchers was that they gave customers a more ideal solution than what had previously been available. 'Ideal' in this sense is defined as the (perceived) benefits that the customer receives divided by the costs and harms that are also present. The fact that successful innovations deliver more ideality implies that there is an overall direction of success. Hopefully this direction – give customers more of the things they want and less of the things they don't – may be seen as a fairly obvious one. While this direction is fairly obvious, what is less obvious, is that this evolution process takes place through a series of discontinuous evolutionary jumps. We usually think of these jumps as steps from one way of doing things to another, or, more formally, jumping from one s-curve to another. As we shall see in a later chapter, the s-curve characteristics that determine how all systems evolve are a central aspect of the innovation dynamic. A key finding of the systematic researchers beyond this is that the steps denoting a shift from one s-curve to the next are predictable. This fact emerges from the study of large numbers of business and

technology system evolutions, and the analysis of what jumps take place as systems shift from one way of doing things to another. The overall dynamic of evolution – with systems making discontinuous jumps from one s-curve to another all the time heading in a direction of increasing ideality is summarized in Figure 1.5 below:

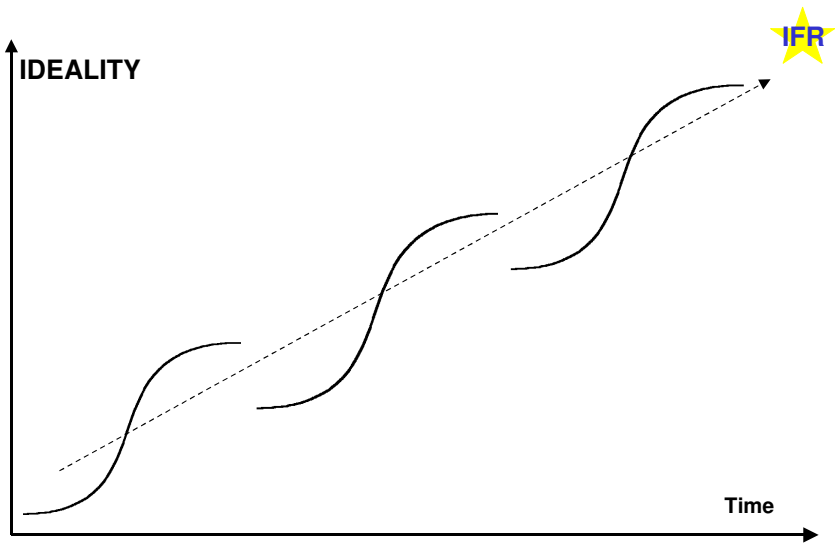


**Figure 1.5: Evolution Dynamics – Systems Jump From One S-Curve To Another In The Direction of Ideal Final Result Outcomes**

The figure actually takes the story a step further by suggesting that the evolutionary direction towards increasing ideality is driven by a destination – called 'Ideal Final Result (IFR) – where the customer has received all of the benefits they require and none of the costs and harms. In most senses the Ideal Final Result is a theoretical rather than a practical limit (although we shall see examples of systems that have achieved this goal in later chapters). Practical use of the idea demands also that we take into account the fact that different customers, as well as different parts of a value network may have very different interpretations of what 'ideal' means to them. Nevertheless, there are certain common themes (e.g. 'free, perfect and now' – Reference 1.1) that make the IFR a useful thing to think about when trying to determine a strategic direction.

A rather more surprising of the IFR idea has been that as systems get closer and closer to their Ideal Final Result destination, the number of possible solutions capable of delivering the desired outcome reduces. Figure 1.6 illustrates this convergent evolution idea. It is not clear whether it will ever be possible to definitively prove that evolution is convergent.

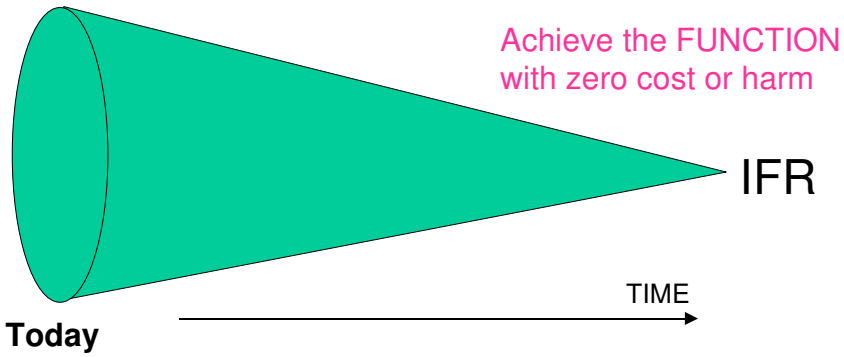


**Figure 1.6: Evolution Is A Convergent Process**

We used to spend inordinate amounts of time trying to convince audiences that it was so, before realizing that it saved a lot of pain and argument by simply stating that a) ever

system we have so far examined has followed such a characteristic, and – more importantly – b) if you merely think of the image as a 'useful image' it will have served enough of a purpose.

Used as a problem definition aid, the ideality part of the toolkit encourages problem solvers to break out of the traditional 'start from the current situation' type of thinking, and start instead from what is described as the Ideal Final Result (IFR). Generally speaking IFR-focused solutions incorporate the concept of systems solving problems 'by themselves'. The key word is 'self'; things that achieve functions by themselves – self-regulating, self-organising, self-correcting, etc – all represent, when incorporated in a true systematic innovation fashion, very powerful and resource-efficient solutions.

**Contradictions**

Taking the Figure 1.5 image of evolution taking place through a sequence of discontinuous shifts a step further, the systematic innovation researchers further identified the fact that what causes the flattened profile at the top of an s-curve is the emergence of a conflict or contradiction. The s-curve flattens at the top, not because we stop trying to improve a system, but because something comes along and stops us. One of the most important findings, then, of the research has been that the world's strongest solutions have emerged from situations in which a problem solver has successfully sought to avoid the conventional trade-offs that everyone else has taken for granted. Having uncovered a number of strategies whereby problems solvers have successfully eliminated compromises and trade-offs, systematic innovation offers tools through which problem solvers can tap into and use the strategies employed by such people. The most commonly applied tool in this regard is a business conflict/trade-off elimination Matrix – a 31x31 matrix containing the three or four most likely strategies for solving design problems involving the most common business trade-off and conflict situation types. Probably the most important philosophical aspect of the contradiction part of systematic innovation is that, given there are ways of 'eliminating' contradictions', managers and business leaders should actively look for them. Instead of being seen as a threat, systematic innovation tells us that every unresolved trade-off and compromise we can find is an opportunity. This is a subtle but often profound shift in thinking for many managers.

**Functionality**

Although the functionality aspects of systematic innovation owe a significant debt to the pioneering work on Value Analysis, the method of defining and using functionality data is markedly different; sufficient at the very least to merit discussion as a distinct paradigm shift in thinking relative to traditional occidental thought processes. Three aspects are worthy of particular note:-

1) The idea that a system possesses a Main Useful Function (MUF) and that any part of the system which does not contribute towards the achievement of this function is ultimately harmful. In a banking insitution, for example, the MUF is to manage the flow of money; everything else in the system – like personnel, sales or marketing departments are there solely because we don't yet know how to achieve the MUF without the support of the ancillary components. (Systems may of course perform several additional useful functions according to the requirements of the customer.)
2) In traditional function mapping, the emphasis is very much on the establishment of positive functional relationships between components. Systematic innovation places considerable emphasis on plotting both the positive and the negative relationships contained in a system, and, more importantly, on using the function analysis as a means of identifying the conflicts, contradictions, in-effective, excessive, harmful and missing relationships in and around a system. Function

and attribute analysis thus becomes a very powerful problem definition and 'complexity management' tool.

3) Functionality is the common thread by which it becomes possible to share knowledge between widely differing business sectors. A matrix management structure is a specific solution to the generic function 'organise people', just as a training department is a specific solution to the generic function 'disseminate knowledge'. By classifying and arranging knowledge by function, it becomes possible for organisations to examine how other businesses in very different disciplines have achieved the same basic 'organise' function. '*Solutions change, functions stay the same*' is a message forming a central thread in the systematic innovation methodology: People want a hole not a drill; benefits not features.

**Resources**

The Resources pillar of systematic innovation relates to the unprecedented emphasis placed on the maximisation of use of everything contained within a system. In systematic innovation terms, a resource is *anything in the system which is not being used to its maximum potential*. The method demands an aggressive and seemingly relentless pursuit of things in (and around) a system which are not being used to their absolute maximum potential. Discovery of such resources then reveals opportunities through which the design of a system may be improved. In addition to this relentless pursuit of resources, systematic innovation demands that the search for resources also take due account of negative as well as the traditionally positive resources in a system. Thus the competitors, subcontractors and forces we typically attempt to fight when we are designing and running systems, are actually resources. Systematic innovation, as we shall later see contains a number of strategies to help us to perform this 'turning lemons into lemonade' switch in the way we think about things that we currently think of as harmful in a system.

**Space, Time And Interface**

Psychological research clearly shows that the human brain is not designed to be creative. It undoubtedly *can be* creative, but that is not one of its main functions. Its main function is to develop and store patterns so that we know how to react in a given situation. Hence, we don't have to think when we get dressed in the morning, or when we drive to work, because we have performed both actions so many times that we have a pre-stored 'program'. Only when something out of the ordinary happens do we have to jump out of these patterns. One such time when the patterns don't help is when we are trying to be creative. This is one of the reasons for the cliché expression 'thinking out of the box'. And it is undoubtedly not an easy thing to do. In particular, our brain very quickly makes assumptions about what a problem is. Very often we only discover later on that we have been solving the wrong thing. An important finding of the systematic innovation research has been that the strongest problem solvers have found ways of overcoming this type of assumption-making phenomenon. The effect is known as 'psychological inertia' or 'paradigm paralysis', and the tools for overcoming the effect involve techniques for forcing problem solvers to shift their perspective on situations. As suggested in the title of this section, there are three dimensions to these perspective-shifting techniques. Experienced systematic innovation users are continuously changing their perspective on problems – zooming in to look at the fine details, zooming out to see the bigger picture, thinking about how the situation is affected by changing time – whether that be nano-seconds or decades – in both the past and future – and also thinking about how different parts of systems interface and relate to one another. This is not a natural process for most people – our brains aren't wired that way – and so we introduce and discuss tools to help in the process of thinking in time, space and interface as we work our way through the book.

## Recursion

Related in some ways to the space-time-interface viewing perspective pillar, the concept of recursion relates to the phenomenon of self-similarity in systems. Specifically, recursion encapsulates the idea that many systems repeat as we switch our focus from the macro scale to the micro-scale and vice versa. By 'repeat', we mean that features that are present at one scale, will also exist at other scales. We will see recursion in action at several points during our exploration of systematic innovation. Two specific instances are worth mentioning here as a way of explaining the implications of recursions.

The first relates to the cybernetics work of Stafford Beer (Reference 1.2). Stafford Beer's Viable System Model emerged from the study of organisation structures and resulted in two very important conceptual findings. The first involved the identification of five essential elements that a system had to contain if it were to be 'viable'. The second involved the idea of recursiveness – and the discovery that the five-element viability test still applied at different hierarchical levels of consideration of a system organisation structure. There are, in other words, certain elements that will determine the viability of a section, a department, a division, a company, a corporation, and so on.

The second involves the recognition that as systems evolve through successive disruptive shifts from one system (s-curve) to another, the complexity of the respective systems recursively passes through a characteristic increasing-decreasing profile – Figure 1.7. This particular recursive effect allows us to utilise the parts of the systematic innovation toolkit most relevant to a given phase in the complexity cycle.

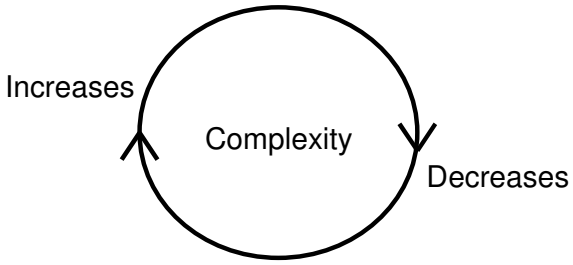


**Figure 1.7: Recursion In System Complexity Evolution**

## Emergence

To reduce the entire scientific and mathematical base of complexity theory to a single philosophical foundation is probably a little unfair given the breadth and depth of work being devoted to the subject. Nevertheless, there is at least some justification for suggesting that the whole field emerged as a result of a very simple idea; that enormously complex systems emerge from what may be extremely simple base rules and principles. The interaction of individually simple elements, in other words, can produce some highly unexpected outcomes.

Businesses and organisations are fundamentally complex systems. Take two people and you have the makings of a system acting on the edge of chaos. Although we shall not see complexity theory discussed explicitly anywhere except in the trends of evolution part of the systematic innovation discussion, its presence is everywhere. The great implication of emergent systems on organisation design is that the success or failure of that system will ultimately depend on the 'DNA' that makes up that organisation. In the organisational context, 'DNA' consists of things like the mission and vision statements, value systems – both formal and informal – and the beliefs of the individuals present. Many business problems occur due to conflicts between what managers wish the system to deliver and what the corporate-DNA says it is capable of delivering. A key idea that emerges from this

in the context of innovation is that it is much easier to achieve success if the innovation comes *from* the DNA rather than *despite* it.

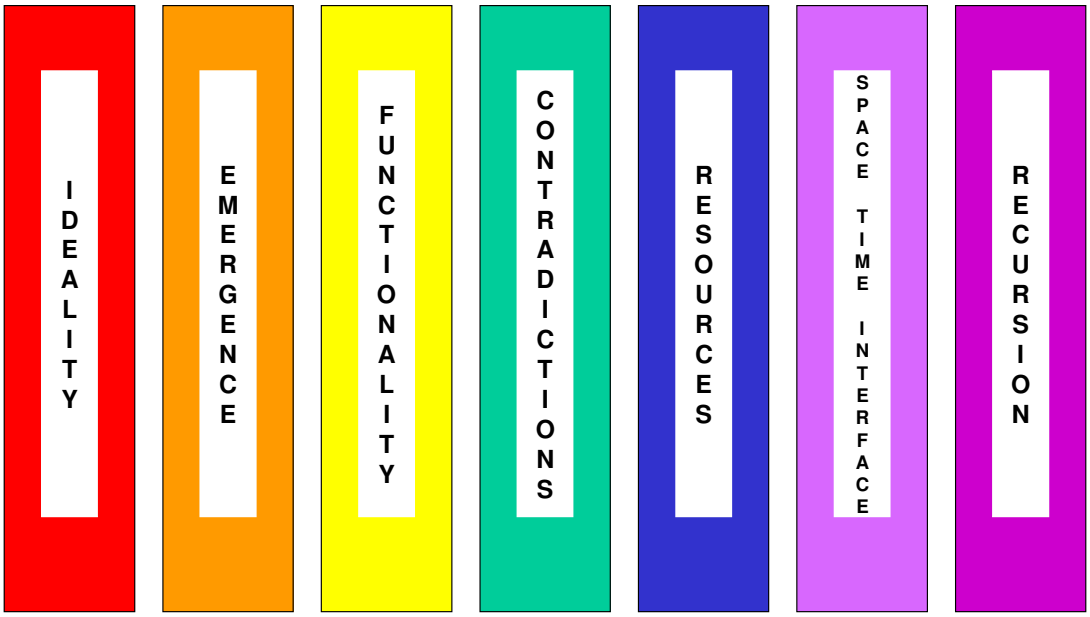


**Figure 1.8: Seven Pillars Summary**

## 2) Defining 'Success'

On of the important assumptions made at the beginning of the chapter was that the systematic innovation research was somehow able to discern what defined a 'successful' innovation. In this section we examine some of the main criteria used to distinguish success from failure.

An obvious test of success is financial. A successful innovation, by definition, must offer paying customers a value proposition that they will pay sufficient for that it not only pays all of the direct and indirect costs of providing it, but also allows the provider to obtain a profit.

Financial success, however, is a very poor means of determining success in any sense that allows us to transfer any useful knowledge to others wishing to create a success of their own. Financial reward is merely the manifestation of success. It has nothing to do with the mechanics of what has *actually* made something successful.

Nevertheless, during the early stages of the systematic innovation research it was important to be correlate financial performance to the underlying mechanisms of success. One of the main objectives of the research has been to identify the mechanics of success in such a way that we can usefully use them to transfer that success to other applications. The way that this has happened is that the researchers have systematically studied known financially successful innovations with the aim of identifying any common factors that they may possess.

Any financially successful innovation inevitably becomes clouded in ego, mythology, the whims of the media, and in a significant number of cases, plain luck. It is absolutely in the interests of anyone involved in an innovation to present that innovation in the best possible light. Consequently, any analysis of a financially successful innovation can only obtain, at best, a partial perspective on what actually enabled the success to take place. Analyse enough cases, however, and gradually consistent patterns begin to emerge.

It is these patterns that we now use as a means of determining whether an innovation can be classified as successful or not. We believe that these patterns offer a series of tests that are much more reliable as an indicator of success than mere finance.

Many innovations that can be classified as 'successful' under the terms of these tests, we now see, have 'failed' in a business context. This doesn't necessarily mean that we have eliminated them from our analysis. In the same way that financially successful innovations become the subject of myth-building, so those involved in innovations that failed have it in their interests to cover what has happened in a cloud of smoke and mirrors. Trying to blow these clouds way, we see that in a great number of such cases, there were many elements of the innovation that were indeed 'successful'. In many cases innovators get almost everything right. 'Almost', however is not good enough to deliver financial success. But just because an innovator failed to get the timing right, or failed to market to the right audience, does not mean that we should ignore all of the good things that happened.

That, then, is the way that the research has been conducted. Almost every attempted innovation has something to commend it. Our job has been to find those 'somethings' and to put them together into a package that allows us to distill out a series of success factors that are generically applicable.

The following is what we have so far come up with. Perhaps not surprisingly, the list connects strongly to the philosophical pillars detailed in the previous section.

### i) Essential Elements

Successful innovation emerges from the interaction of five essential elements. These are illustrated in Figure 1.9.

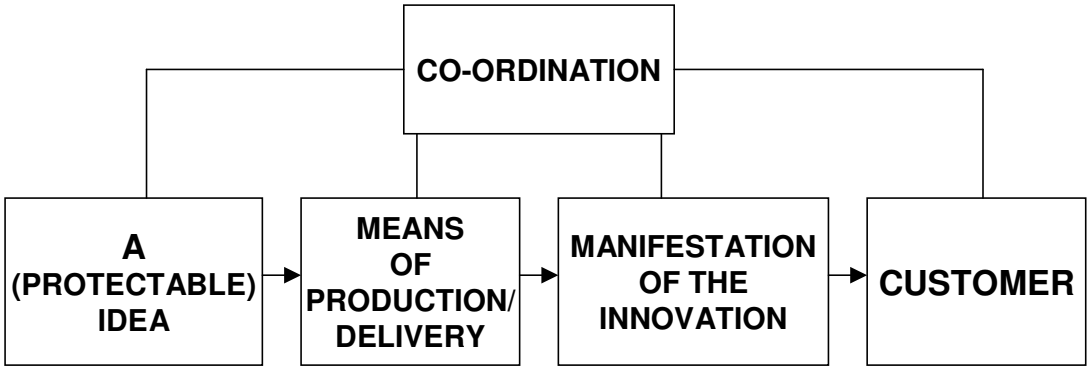


**Figure 1.9: Essential Elements Of A Successful Innovation**

In more detail, the five elements comprise the following:-

a) An Idea. The most obvious part of the list; without the idea, there will be no innovation. The figure includes the word 'protectable' in parentheses. There have certainly been successful innovations that have not had any kind of copyright or patent protection, but they are few and far between. Even fewer are the cases of unprotected ideas that allow a company to sustain their presence. Unprotected ideas are easy to copy. The only sustainably successful innovations where there is no formal protection are either narrow niches or (more likely) situations where one or more of the means, manifestation or co-ordination are so good that they preclude the successful entry of a competitor.
b) A Customer. The next most obvious element of the five is the customer. Without a customer demand for the innovation – whether that demand be a stated need

or one that is 'hidden' – there will be no success. We will talk a lot more about identifying customer needs in future chapters. The large majority of organizations are very bad at anticipating the future needs of their customers (and non-customers). Likewise, the vast majority of customers are very bad at being able to describe what there future needs and desires are. Systematic innovation will allow us to do a much better job of anticipating those spoken and unspoken needs.

c) A Manifestation. Whether it is a product or a service, there has to be a manifestation of the idea. The manifestation may be physical or virtual.
d) A Means. Very many innovations fail because the idea is not produce-able in an economic manner. The problem may be lack of ability to manufacture or deliver, or it may simply not be possible to produce at a sufficiently low cost.
e) Co-ordination. If the other four elements are not managed and co-ordinated then again the innovation will fail. The co-ordination part of the story is largely about timing, and making sure all of the other elements are in the right place at the right time.

The next series of tests all relate primarily to the 'Idea' element, and what makes an idea into one capable of delivering a successful innovation:

### ii) Function

Successful innovations recognize that customers buy functions. People don't buy a watch they buy the ability to tell the time. Either that or they are buying a statement about their wealth or fashion consciousness. Functions, in other words, can be tangible or intangible. In both cases, function is king.

### iii) Ideality

As already discussed, successful innovations travel in the direction of increasing (customer) ideality. (Perceived) benefits divided by the sum of cost and harm. One test of a successful innovation, therefore, is that at least one customer segment receives a more ideal solution than the one they already have. Broadly speaking, the more segments that perceive your innovation as 'more ideal', the more successful it will be.

### iv) Resources

A slightly more subtle test of a successful innovation is that the problem identifies and makes use of a resource that no-one has previously recognized as a resource. This is particularly so, if the 'resource' is seen has previously been viewed as a negative thing. Turning lemons into lemonade breeds innovation success.

### v) Contradiction

Probably the single most important test of a successful innovation. Success happens when conflicts, trade-offs and contradictions are 'eliminated' (Reference 1.3). While it is not always the case that a contradiction is completely eliminated, what is important is that it is challenged to such an extent that a step-change jump in the direction of the Ideal Final Result takes place.

### vi) Trend Jumps

The final test of successful innovation involves the discontinuous trend jumps uncovered during the research. A product or service that makes such at least one advance along one of the trends is likely to be a successful one.

## 3) Context

A commonly asked question is 'when should I use systematic innovation?' It is easier to answer this question by examining situations in which it is *not* going to be helpful. There are two such situations:-

a) if we are simply looking to replicate something that we have already done before. This 'here's one I did earlier' situation, frankly does not need a systematic innovation methodology to help achieve it.
b) if we are looking to 'optimize' a system. Systematic innovation contains virtually no mathematics and so if we are trying to answer questions like 'what is the optimum batch size?' or 'what is the best interest rate?' or 'what bonuses should everyone get this year?' then systematic innovation is not going to help.

Both of these situations are rare in our view. Or rather they ought to be. In the first case, it is our belief that there is no such thing in reality as an 'identical' situation in a management context. Anything that involves people has to recognize that every one of us is different, and that every one is different at different times. 'You can never step in the same river twice' as the old adage goes. Systematic innovation can play a significant part in identifying and doing something about the differences between last time and this.

In the case of optimization problems, systematic innovation adopts a somewhat different view. 'Optimum' is a dangerous word in systematic innovation because it implies the presence of trade-offs and compromises. Any managers that has faced the onerous task of allocating staff bonuses will know that there is no way to satisfy everyone. This is a characteristic common to all 'optimum' or 'best' calculations since what is best for one situation is anything but for another. Whenever a systematic innovation user sees the word 'optimum', they immediately visualize the existence of a conflict or a contradiction. As we saw earlier, eliminating contradictions will always be preferred to finding an optimum average.

Of the remaining situations where we believe systematic innovation is the most beneficial, it is worth discussing two here. Both relate to s-curves again (we will see many more instances too as we progress through the book). Figure 1.10 illustrates a very common situation in many businesses.

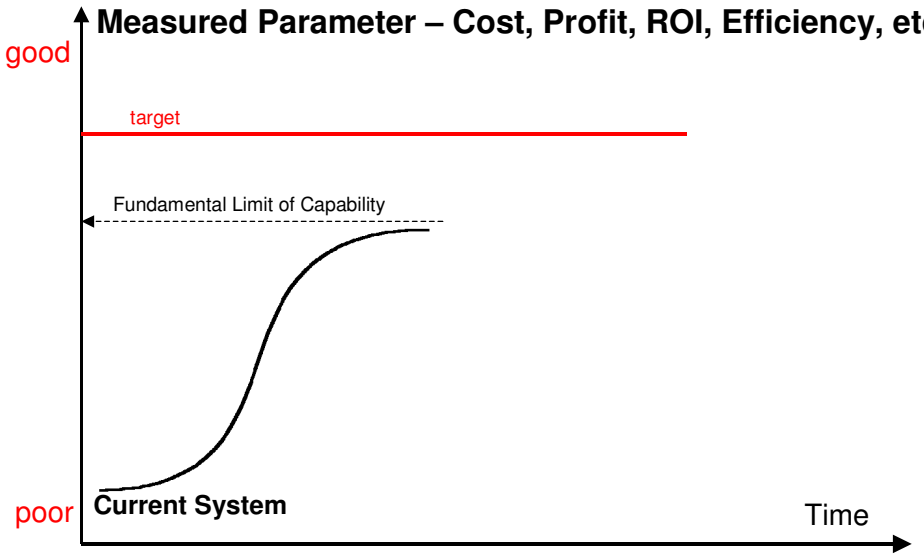


**Figure 1.10: The Over-riding Importance Of Evolutionary S-Curves**

In the figure we see the setting of a target that lies beyond the fundamental capability of the system expected to deliver it. All systems will eventually find themselves in this situation irrespective of what parameter we are interested in improving. The more competitive the industry, the quicker it will tend to happen. When we find ourselves in this position then all of the normal things we would do to improve will no longer work. We could optimize and optimize the system from now until the end of time and still fail to bridge the gap between capability and target. 'Fundamental Limit', unfortunately, means exactly that.

When we find ourselves in this position, we are basically faced with two choices; change the target or change the system. One of the two is undoubtedly easier to achieve than the other. Changing the target, however, tends not to offer a recipe for long term business success – unless we can convince our competitors to change the target too. That, then, leaves the option of changing the system. This is undoubtedly the more difficult of the two options. This also happens to be an area where systematic innovation excels. As suggested in Figure 1.11, systematic innovation offers three mechanisms for enabling us to identify the relevant system change that will permit the target to be achieved. Each of the three is covered in detail in separate chapters later in the book. For the moment it remains sufficient to say that we will be able to identify the required jumps in a systematically reproducible manner. Moreover - and an important final word on this topic – what the method will also tell us is which part of a system it is that needs to be changed. When a system hits a fundamental limit, in other words, it is usually one element within that system that has hit its limit. Hence we don't have to completely scrap our current way of doing things in order to 'change the system' – merely find the limiting element and change that.

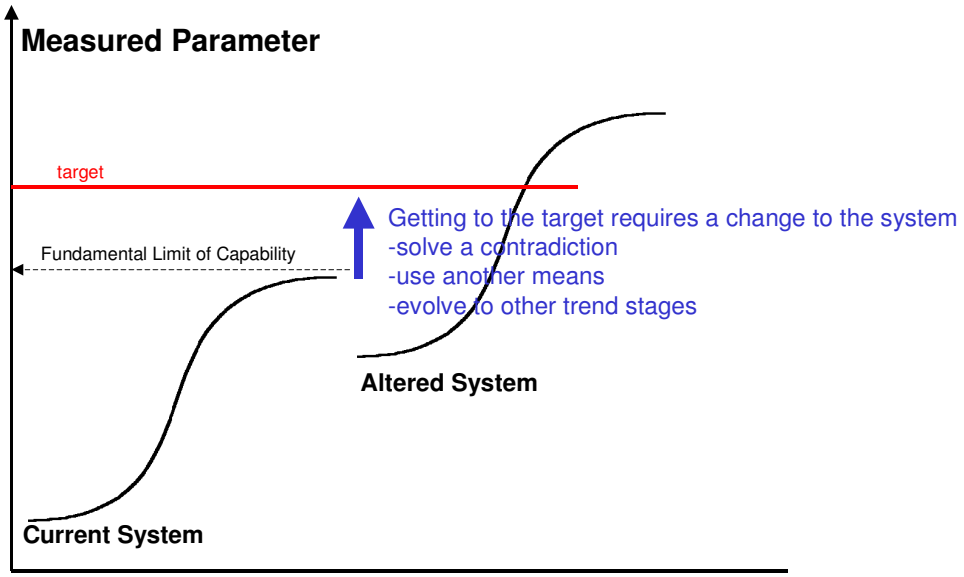


**Figure 1.11: Systematic Innovation Tools Bridging The Gap Between Limit And Target**

The second major application scenario for systematic innovation occurs when there is currently no system. Here the method can help us to conceive what systems should look like when we are starting from a clean sheet of paper. When we are using the methods in this role we will be guided by the Ideal Final Result concept. Figure 1.12 reproduces a version of the conical evolution image from Figure 1.6. The figure is here modified to outline the main evolution directions available to us in any innovation situation.

The first (and most commonly applied) direction involves starting from today's system and using the relevant tools to change to become more ideal. The second involves the 'use another means' idea from Figure 1.11. This is another strategy that allows us to change to

another s-curve by shifting to a solution that exists somewhere and which we can import into our situation. The third direction is the one more attuned to the blank piece of paper start point. This is the direction that tells us to forget about today's system, and to think instead about the Ideal Final Result.

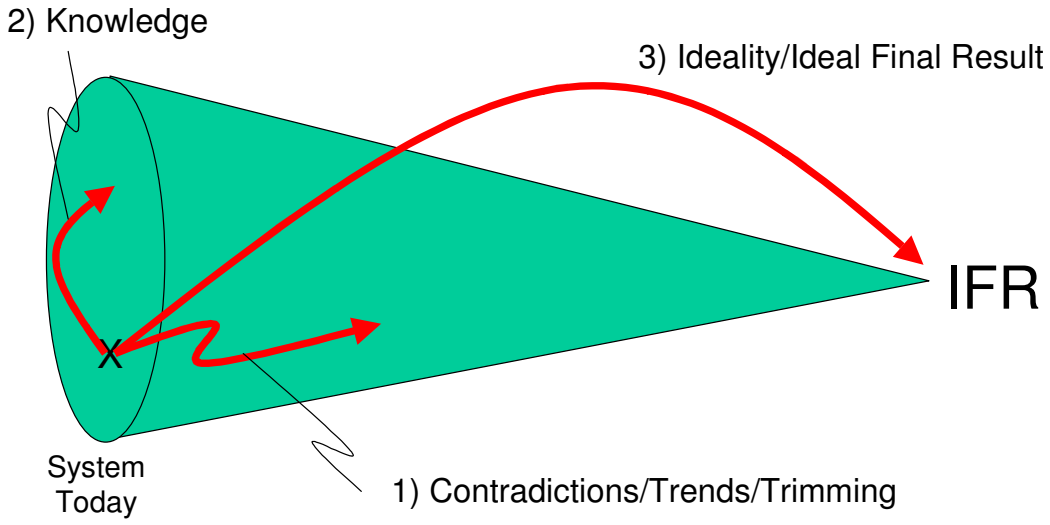


**Figure 1.12: Three Main Innovation Directions**

All three routes are relevant. Which one we will choose will depend on our context. If we are bound to starting from what we already have, then we are most likely to choose route 1; if we have the ability to look outside and start again using proven capabilities from elsewhere, then we are more likely to explore route 2. Finally, if we have the freedom to completely start again, or are looking to get into a new market, then route 3 is the most appropriate direction.

The overall process should ultimately act as our guide. Chapter 10 in particular is designed to help identify which tools are most appropriate in which contexts. In the meantime, the Figure 1.12 image is, we think, a useful one to keep in mind when thinking at the big-picture, helicopter-view level.

## 4) Time Implications

Systematic innovation is not and never has been designed as a recipe to be followed blindly. It requires you to think about what is happening, and it requires you to do some work. We are reminded here of the Toyota lean production system and the following quote from the Head of Toyota Consulting *"The Toyota production system has been studied by the West over the past 20 years. Many books and videos are available. The book, 'The Machine that Changed the World', provides all you need to know to implement the Toyota production system. Yet everywhere I go in the west I see no evidence of its implementation. What do we see that you do not see?"* And a comment by Konosuke Matsushita, Founder of Matsushita Electric Industrial Co., Ltd & PHP Institute from 1979: *"We are going to win and the industrial West is going to lose out; there is not much you can do about it because the root of your failure is in yourselves. Your firms are built on the Taylor model. Even worse, so are your heads. With your bosses doing the thinking while the workers wield the screwdrivers, you're convinced deep down that this is the right way to run a business. For you the essence of management is getting the ideas out of the heads of the bosses and into the hands of labour. We are beyond the Taylor Model.*

*Business we know, is now so complex and difficult, the survival of firms so hazardous in an environment increasingly unpredictable, competitive and fraught with danger, that their continued existence depends on the day-to-day mobilisation of every ounce of intelligence."*

In other words, sure, you can follow a recipe, but don't forget there are some underlying 'why's' behind it, and that it is a good idea to think about them. In another old adage, a surgeon can be trained to remove an appendix in about an hour, but it takes several years to work out what to do when something not in the basic recipe happens. Same thing here, albeit, if you don't start getting some immediate benefit, we have failed in our main goal.

If that hasn't put you off, we need to talk a little bit more about the underlying 'why's' of systematic innovation in its business context:

The essence of its philosophy is distillation of large quantities of knowledge and experience into a small, manageable entity. It might take users a considerable amount of time to appreciate the significance of the seven philosophical pillars of systematic innovation, but they can at least be remembered in a few minutes.

At the other end of the hierarchy pyramid, the toolkit contains a series of tools that, to varying degrees can be learned and applied also in a relatively short space of time. There is a deal of variation, but as an average, a half-day of learning and doing is usually enough to give a newcomer the will, confidence and ability to use a given tool.

In between toolkit and philosophy, the learning curve for the complete systematic innovation method and processes (with or without software 'support') is probably measurable in weeks.

'Weeks' unfortunately is then at the heart of a big problem for the large majority of newcomers. A week is a serious investment of time for anyone in these busy times; there is simply too much else needing to be done, and not enough time to do it. Does this mean we should give up? Or does it mean that it might be better to think about alternative ways of doing things? The latter would appear to make the most senses.

**Different User Profiles**

Figure 1.13 illustrates a graph compiled from the experiences of watching several hundred students, strategists and managers go through at least two-days worth of systematic innovation 'training'. (Two days is a typical figure since most managers tend to think a one-day event will be too trivial, and they are too busy to be away for any longer than two. It is however a very short period of time in relation to the amount of content – which is equivalent to an MBA in many respects.)

The first category of user types is the 'not for me' variety. This is the individual who, for whatever reason (with bad teaching and instinctive aversion because people have been instructed to attend by their boss being probably the top two reasons), decides they do not like systematic innovation or do not want to commit the time necessary to learn it.

The second category involves those who discover a part of systematic innovation that they like and chose to adopt it into their way of doing things. This 'part' might be a tool like the Business Conflict Matrix or the Trends of Evolution, or it might simply be one or two of the Inventive Principles. At the end of their initial exposure to the toolkit, this category of user has achieved some success using the particular tool or element of, is 'satisfied' by that success, and shows no desire to expand their knowledge further. In some small way, however, this category of user has been changed by their experience.

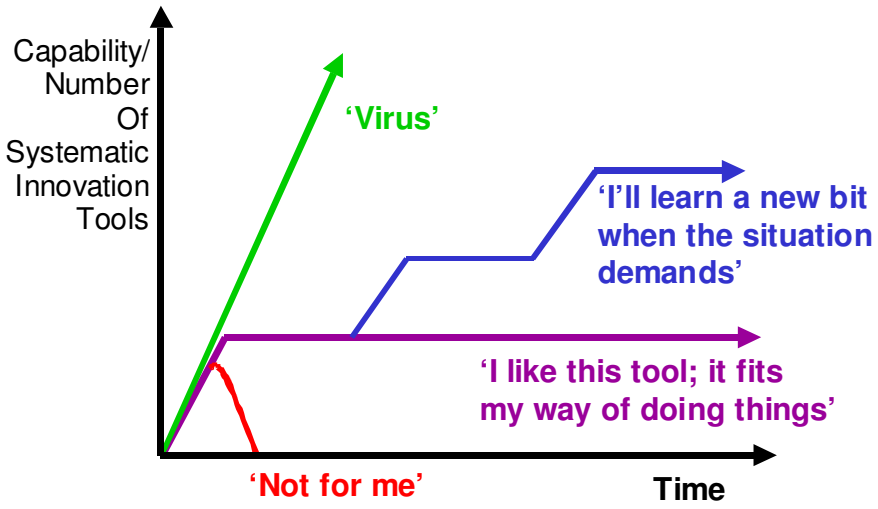


**Figure 1.13: Typical Systematic Innovation User Profiles**

The third category of user might be seen as the pragmatist. They usually start as users of the second category, but find that there are certain types of problem – or more usually a specific problem – that the tool they know has failed to solve. They therefore look at other elements of the toolkit until they find something that does solve the problem. The success with the new tool then prompts the incorporation of that tool into that persons 'way of doing things'. (The importance of 'success' in determining whether someone picks up a part of systematic innovation or not cannot be under-estimated.)

The fourth category of user profile is what is commonly described amongst long-time systematic innovation users as 'having the virus' or 'being infected'. This type of user typically reads all of the books, papers and articles they can find on the subject, and it changes the way that they do things.

**The Folly of 'I Am Right; You Are Wrong'** (Reference 1.4)
Everyone has their own way of doing things. Some of these ways are demonstrably more effective than others, but nevertheless those embedded ways are present and they are constraints that will dictate how much and which parts of systematic innovation people will be attracted to and which they will reject. So which are the most important parts of systematic innovation? The simple answer to the question is that it depends. It depends on the circumstances of the problem or opportunity under consideration, it depends on the user, and it depends on how the tools are presented to them.

To take a cooking analogy; there are definitely right and wrong ways of using the various tools contained in the kitchen. There is a right and a wrong way of holding a whisk, in the same way that once we have picked the whisk up by the handle instead of the blades, there is then a considerable degree of flexibility in how we can use the tool to achieve the desired function; we can stir clockwise or anti-clockwise, with or without a vertical component of motion, we can stop and start, we can change speed, we can change direction, we can do pretty much anything so long as the whisk is in the product and moving it.

At a higher level, we can then use a recipe to help us sequence ingredients and the things we do to them in order to eventually get me to a finished product. If we are trying to make soup, we could probably find several hundred recipes to help us do it. Some will say put the stock in first, and some will say don't. Assuming that the different authors are all trying to help me make soup that is edible, we can probably safely assume that each of them has

created a recipe that will work. Some recipes will produce better (to us!) soup than others, but they will all provide us an output that looks and functions like soup.

The point is to find something that fits your way of doing things (whether it be one individual principle or a complete problem solving method/recipe). As far as this book is concerned, one of the major underlying aims has been to present things in a way that enables this pick-and-choose flexibility to happen.

**Self-Adapting Systems**

A large proportion of users will only ever know and use one or two tools from the toolkit. Chapter 18 later in the book suggests the importance of 'self' in the drive towards increased ideality; self-regulating, self-organising, etc, and any system that works out 'for itself' what is right are all good solution directions. If systematic innovation is about encouraging people to think, perhaps a useful goal would be to offer them a structure that allows them to – as much as is feasibly practical – mix and match tools (both within and beyond the current bounds of the method) to suit their particular individual circumstances. In other words, that they are able to adapt what tools and methods they use, how and when they use them to suit themSELVEs.

If we choose to ignore a recipe that is our decision. If we're making soup it doesn't matter- we may get a thin soup or a thick one or even a stew, but it will be edible. If we're making bread, and stray too far from the recipe, we will end up with something that isn't bread, and might not even be edible, or we might end up with something exciting and new. The former is usually more likely than the latter however, so in future, we might be well advised to follow some form of structure. We also know that we each have our own tastes and that if we take a bit of this recipe and add a bit of that and then add this bit of our own, then we will end up with our ideal bread. 'Our' being the important word.

If we ask ourselves the question is it better for us to adapt to systematic innovation or for it to adapt to us, for the most part, many of us (especially those working in a time-constrained environment) would choose the latter. This again represents an important underlying theme of the book and its layout.

## Overview of Other Chapters

Beyond the first three chapters, this book has been designed as a working reference rather than a start-to-finish read. The first three chapters represent the part describing the big picture in more detail than has been relevant in this helicopter-level view; the following chapters are then divided so that each describes and shows you how to use each of the different parts of the toolkit. The different tools, then, are:-

Chapter 4 – System Operator (9-Windows) – detailing a specific tool to assist in the process of thinking in terms of space, time and relationship. This chapter forms a bridge between the overview chapters and the other specific tools – the 9-Windows representing a tool in their own right, but the underlying concepts are used extensively in every other aspect of systematic innovation.

Chapter 5 – Problem Definition (Problem/Opportunity Explorer) – the first of five chapters describing problem definition tools. This first one is the most general in nature; setting the scene for defining where we are trying to get to, what is stopping us, and what resources we have available to help us get there.

Chapter 6 – Problem Definition (Function/Attribute Analysis) – detailing the process of managing problem complexity by modelling the positive and negative functional relationships between the different components, people or other elements of a system.

Chapter 7 – Problem Definition (S-Curve Analysis) – the evolutionary s-curve concept plays an important role in systematic innovation. This chapter details that role and how it impacts on the overall problem definition process.

Chapter 8 – Problem Definition (Ideal Final Result) – closely allied to the ideality concept, is a tool called 'Ideal Final Result'. The Ideal Final Result tool actually has two forms. In Chapter 8 it is discussed in the context of its role as a problem definition aid. The main idea of the tool is that it encourages users to define a somewhat different situation to the one they might otherwise.

Chapter 9 – Problem Definition (Perception Mapping) – the Perception Mapping tool has been designed specifically for problem settings involving people. Every one of us sees the world around us through different eyes. This results in perceptions of reality that may be different from one another. This tool allows us to manage the inevitable complexity that arises when we try to make sense of the different views and perceptions that different people possess.

Chapter 10 – Select Tool – as stated earlier, the systematic innovation toolkit is very richly populated with solution generation tools. Chapter 10 acts as the transition between problem definition and problem solving; offering users a road map that directs them to the most appropriate solving tool for any given problem or opportunity situation.

Chapter 11 – Problem Solving Tools (Conflict & Trade-Off Elimination/Inventive Principles) – a chapter where we detail the mechanics whereby the successful trade-off eliminating business solutions of others can be legitimately transferred to our situations. Of specific interest in this chapter are trade-offs in which, as we try and improve one aspect of a system, some other aspect gets worse or prevents us. The chapter also includes a reference detailing the 40 known strategies for eliminating trade-off solutions.

Chapter 12 – Problem Solving Tools (Contradiction Elimination) – related to the previous chapter, but this time focusing on problem situations which contain a contradiction – for example, where we want something to be 'present and absent' or 'big and small', 'independent and attached', etc – and detailing strategies for their elimination.

Chapter 13 – Problem Solving Tools (Measurement Standards) – in which we describe a test that defines the viability of any kind of system, and detail a series of commonly found problem scenarios involving such systems, and the most powerful problem resolution strategies.

Chapter 14 – Problem Solving Tools (Linear and Non-Linear Trends of Evolution) – detailing a host of linear trend directions and over 30 discontinuous trends of business evolution and how they apply in both strategic and problem solving situations. This chapter also introduces the concept of evolutionary potential – defined as the distance that a system is able to evolve from its current state to known evolutionary limits.

Chapter 15 – Problem Solving Tools (Resources) – detailing strategies for identifying and utilising system resources, and putting them to best use. The chapter shows how most organisations not only make poor use of most of their resources, but often don't recognise their existence.

Chapter 16 – Problem Solving Tools (Knowledge) – in which we discuss the importance of context in the search for existing knowledge from other areas, and detail strategies for effective knowledge searching.

Chapter 17 – Problem Solving Tools (Re-Focus/Re-Frame) – The Re-Focus/Re-Frame ($RF^2$) tool is primarily designed and used as a back-up if other tools within the systematic innovation portfolio are not producing adequate results.

Chapter 18 – Problem Solving Tools (Trimming) – detailing a simple a tool that can help in reducing the complexity of systems. Closely related to business process re-engineering in many senses, the 'trimming' tool is accompanied by a set of rules that determine when it is and isn't possible to remove elements from a system.

Chapter 19 – Problem Solving Tools (Ideal Final Result) – detailing the problem solving side of the Ideal Final Result tool.

Chapter 20 – Problem Solving Tools (Psychological Inertia Tools) – another set of 'back-up' tools that are intended to help users 'think out of the box' in those situations where this is required and other tools are not providing the necessary shifts.

Chapter 21 – Problem Solving Tools (Subversion Analysis) – detailing one of the more specialised systematic innovation tools – this one being used in situations where we are trying to improve the robustness of a business model, strategy, organisation structure or other system elements.

Chapter 22 – Solution Evaluation – shifting from problem solving to solution evaluation, this chapter details strategies for making legitimate apples-versus-oranges comparisons between different solutions in order to identify the one that best meets the problem boundary conditions.

Chapter 23 – Into The Future – a short summary chapter examining where systematic innovation itself may be expected to evolve in the future in its business and management contexts.

Each chapter is divided into a number of different sections. Each chapter possesses a similar structure; firstly combining descriptions of the tool under consideration and a series of case study examples of the tool in action. Then, where relevant, subsequent sections describe possible alternative means of actually using the tool; a summary containing 'what do I do' hints, and then finally, a reference section in which the tool content is shown in detail. The latter two parts are there primarily for the use of practitioners. Readers who are simply interested in obtaining a snapshot overview of a given tool, may like to read just the first parts of each chapter.

**What Do I Do?**

The book has been designed as something that can be read from start to finish, and also be dipped into as a working reference. The general hope is that you will find a way if using the book to fit whatever style of working you personally prefer; there is a complete process we have called 'systematic innovation' for those that want it, or you may prefer to just

concentrate on one or two individual tools. Either way, the main aim is to get the reader to a point of delivering tangible success in the shortest possible space of time.

If you are new to systematic innovation, we recommend you read the next two chapters to get a broader feel for what the bigger picture looks like and how it matches to the ways in which our brains function.

Whatever happens, you should keep in mind the seven pillars of the method – CONTRADICTIONS, IDEALITY, FUNCTIONALITY, RESOURCES, RECURSION, EMERGENCE and SPACE/TIME/INTERFACE – in everything you do with TRIZ.

**References**


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3) Mann, D.L., 'Design For Wow', TRIZ Journal, October 2002.
4) De Bono, E., 'I Am Right; You Are Wrong', Penguin Books, 1991.