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Our Uncertain Future

David Cleden

Risk arises from uncertainty but it is difficult to express all types of uncertainty in terms of risks. Therefore managing uncertainty often requires an approach which differs from conventional risk management. A knowledge of the lifecycle of uncertainty (latency, trigger points, early warning signs, escalation into crisis) helps to inform the different strategies which can be used at different stages of the lifecycle. This paper identifies five tenets to help project teams deal more effectively with uncertainty, combining pragmatism (e.g. settle for containing uncertainty, don't try to eliminate it completely), an emphasis on informed decision-making, and the need for projects to be structured in an agile fashion to increase their resilience in the face of uncertainty.

Keywords: Agility, Decision-Making, Latent Uncertainty, Management Strategies, Resilience, Risk, Trigger Point, Uncertainty, Uncertainty Lifecycle, Unexpected Outcomes.

1 Introduction

There is a fundamental truth that all management professionals would do well to heed: *all risks arise from uncertainties, but not all uncertainties can be dealt with as risks.* By this we mean that uncertainty is the source of every risk (arising from, for example, information that we don't possess, something that we can't forecast, decisions that have not yet been made). However, a set of project risks – no matter how comprehensive the risk analysis – will only address a subset of the uncertainties which threaten a project.

We know this empirically. For every credible risk that is identified, we reject (or choose to ignore) a dozen others. These are 'ghost risks' – events considered to be most unlikely to occur, or too costly to make any kind of effective provision for. Risk management quite rightly acts on priorities: what are the things that represent the greatest threat to this project, and what action can be take to reduce this threat? But prioritisation means that at some point the line is drawn: above it are the risks that are planned for and actively managed. Below the line, these risks have a low likelihood of occurring, or will have minimal impact if they do, or (sometimes) have no effective means of prevention or mitigation. Not surprisingly, where the line is drawn very much depends on a project's 'risk appetite'. A project with a low risk appetite where human lives or major investment is at stake, will be far more diligent in the risk analysis than one where the prospect of failure may be unwelcome but can be tolerated.

No matter where the line is drawn in terms of risks we choose to recognise, there remain risks that cannot be formulated at this time, no matter how desirable this might be. By definition, if we cannot conceive of a threat, we cannot formulate it as a risk and manage it accordingly, as Figure 1 shows. These may be the so-called 'black swan' events, or 'bolts from the blue' – things that it would be very difficult, if not impossible to know about in advance – or, just as

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likely, they may be gaps in our understanding or knowledge of the tasks to be undertaken.

A knowledge-based analytical approach is often helpful to understanding the threat from this kind of uncertainty. Some uncertainty is susceptible to analysis and can be managed as risks, but some cannot. We don't know anything about these risks (principally because we have not or cannot conceive of them) but it is entirely possible that some of these would rank highly in our risk register if we could.

Let's examine the possibilities (see Figure 2). The top-left quadrant describes everything that we know (or think we know about the project). This is the knowledge which plans are built on, which informs our decision-making processes and against which we compare progress. Broadly speaking, these are the facts of the project.

Often there are more facts available than we realise. These are things that we don't know, but could if we tried. This untapped knowledge can take many forms – a col-

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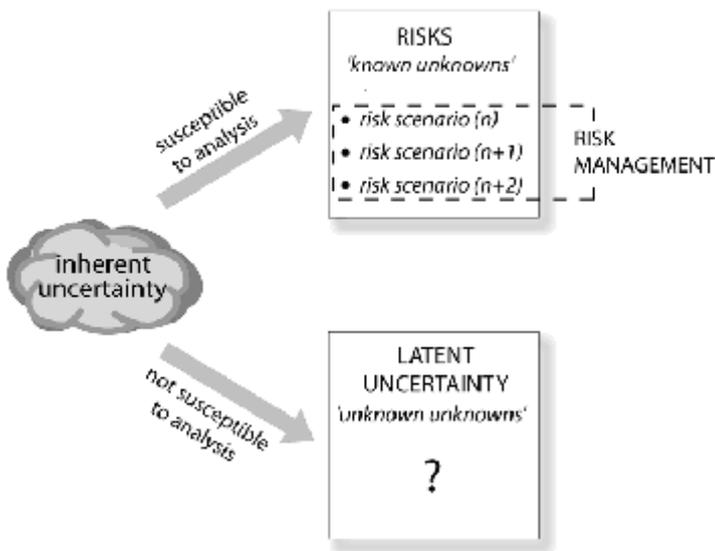
Figure 1: Not All Uncertainties can be analysed and formulated as Risks.

league with relevant experience or skills that we haven't consulted, lessons learnt from a previous project which could aid our decision-making, standards, guidelines and best practices which the project team have overlooked – and many other things besides. In the knowledge-centric view of uncertainty, clearly the more facts and information we possess, the better able we are to deal with uncertainty.

Naturally, no matter how good our understanding of the project's context, there will always be gaps. By acknowledging this, we accept that there are some things about the project that we don't know or can't predict with accuracy (the classic 'known unknowns'). However, as long as they can be conceived of, they can be addressed as risks using risk management techniques.

What does this leave us with? The fourth quadrant, the 'unknown unknowns' represents the heart of uncertainty. This kind of uncertainty is unfathomable; it is not susceptible to analysis in the way that risks are. By definition we have little knowledge of its existence (although if we did, we might be able to do something about it). Some terrible event (a natural disaster or freak combination of circumstances, say) may occur tomorrow which will fundamentally undermine the basis on which the project has been planned, but we have no way of knowing the specifics of this event or how it might impact the project.

Note that it is possible to know a situation is unfathomable without being able to change the fundamental nature of the uncertainty. Someone may tell us that a terrible danger lurks behind a locked door, but we still have no idea (and no practical way of finding out) what uncertainty faces us if we unlock the door and enter. We know the situation is unfathomable but we don't know what it is that we don't know. In other words, the future is still unforeseeable.

All this points to a need for a project to have not only a sound risk management strategy in place, but an effective strategy for dealing with uncertainty. The unfathomable uncertainty of 'unknown unknowns' may not be susceptible to the kind of analysis techniques used in risk management, but that doesn't mean a project cannot be prepared to deal with uncertainty.

2 The Lifecycle of Uncertainty

Any strategy for managing project uncertainty depends on an understanding of the lifecycle of uncertainty. At different stages in this lifecycle we have different opportunities for addressing the issues.

It begins with a source of uncertainty (see Figure 3). In the moment of crisis we may not always be aware of the source, but hindsight will reveal its existence. If detected early enough, *anticipation strategies* can be used to contain the uncertainty at source. Anticipating uncertainty often means trying to learn more about the nature of the uncertainty; for example by framing the problem it represents, or modelling future scenarios and preparing for them. Using *discovery techniques* such as constructing a knowledge map of what is and isn't known about a particular issue can highlight key aspects of unfathomable uncertainty. Of course, once a source of uncertainty is revealed, it is no longer unfathomable and can be dealt with as a project risk.

The greatest threat arises towards the end of the uncertainty lifecycle as problems gain momentum and turn into crises. Something happens to trigger a problem, giving rise to an unexpected event. For example, it may not be until two components are integrated that it becomes apparent that incorrect manufacturing tolerances have been used. The latent uncertainty (what manufacturing tolerance is needed?) triggers an unexpected outcome (a bad fit) only at the point of component integration, even though the uncertainty could have been detected much earlier and addressed.

This trigger may be accompanied by early warning signs.
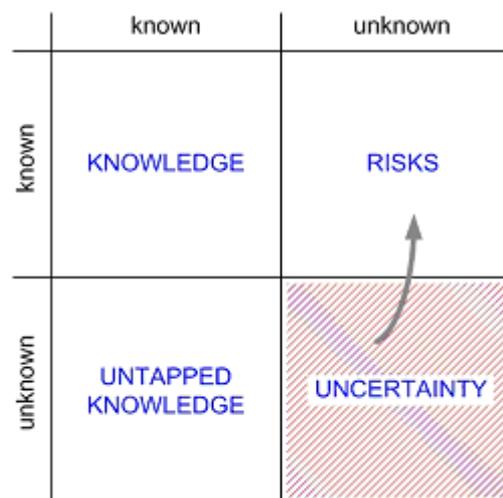
Figure 2: A Knowledge-centric View of Uncertainty and Risk.
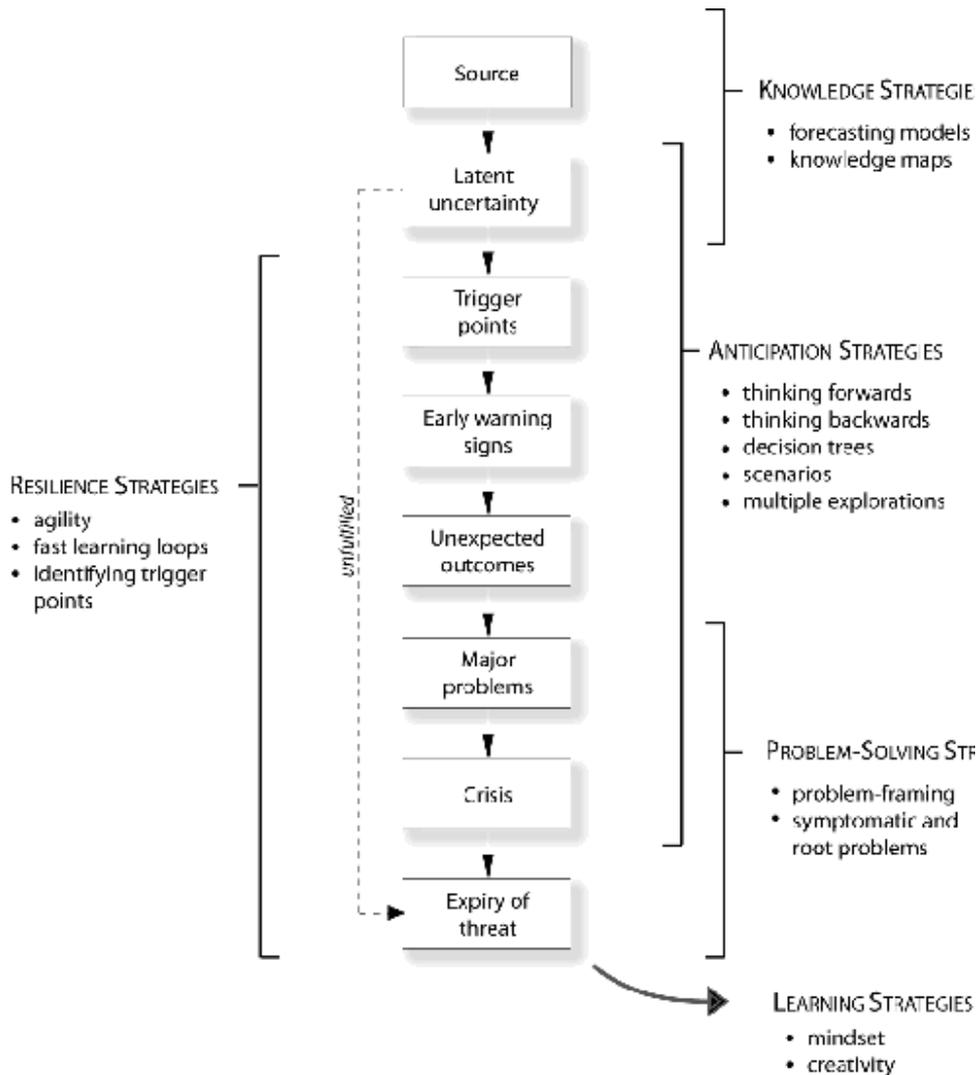
Figure 3: The Uncertainty Lifecycle and the Strategies Best Suited to addressing Uncertainty.

An alert project manager may be able to respond swiftly and contain the problem even without prior knowledge of the uncertainty, either by recognising the warning signs or removing the source of uncertainty before it has a chance to develop.

It is also worth remembering that many kinds of uncertainty will never undergo the transition which results in an unexpected outcome. Uncertainty which doesn't manifest as a problem is ultimately no threat to a project. Once again, the economic argument (that it is neither desirable nor possible to eliminate all uncertainty from a project) is a powerful one. The goal is to focus sufficient effort on the areas of uncertainty that represent the greatest threat and have the highest chance of developing into serious problems.

Based on this understanding of the uncertainty lifecycle,

different sets of strategies are effective at different points:

■ **Knowledge-centric strategies:** These help to reveal the sources of uncertainty, resolve them where possible or prepare appropriately, for example through mitigation planning and risk management.

■ **Anticipation strategies:** These offer a more holistic approach than the knowledge-centred view of uncertainty. By looking at a project from different perspectives, for example by visualising future scenarios and examining causal relationships, previously hidden uncertainties are revealed.

■ **Resilience strategies:** Trying to contain uncertainty at source will never be 100 percent successful. Therefore, a project needs resilience and must be able to detect and respond rapidly to unexpected events. Whilst it is impossible

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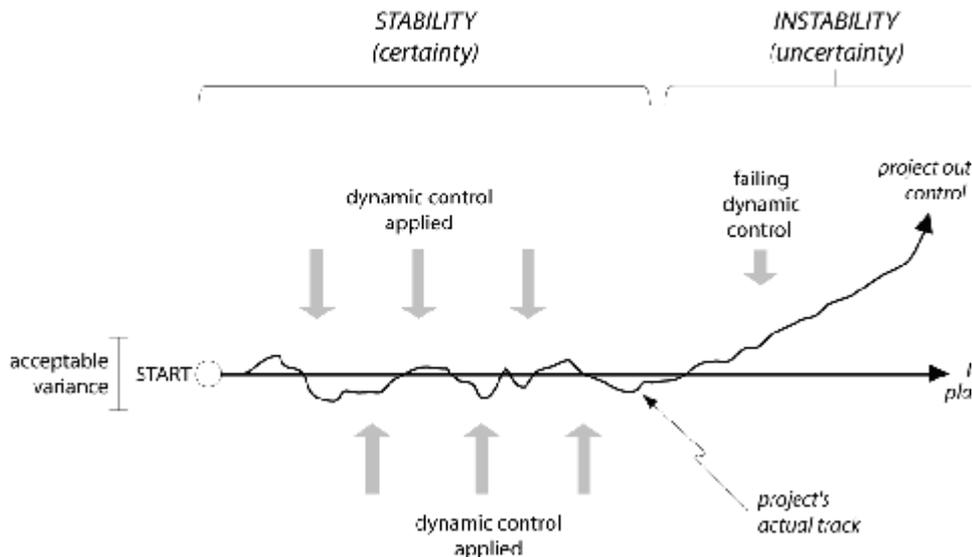
Figure 4: The Illusion of Project Stability.

to predict the nature of the problems in advance, a project manager can employ strategies which will imbue their projects with much greater resilience.

■ **Learning strategies:** These give the project manager and the organisation as a whole the ability to improve and benefit from experience over time. No two projects face exactly the same uncertainty, so it is important to be able to adapt and learn lessons.

3 Five Tenets for Dealing Effectively with Project Uncertainty

3.1 Aim to contain Uncertainty, not eliminate it

No individual can bring order to the universe, and neither can the project manager protect his or her project from every conceivable threat. Managers who try to do this labour under unworkable risk management regimes, constructing unwieldy risk logs and impossibly costly mitigation plans. Amidst all the effort being poured into managing small, hypothetical risks (the 'ghost risks'), a project manager may be too busy to notice that the nuts and bolts of the project – where the real focus of attention should be – have come loose. It is much better to concentrate on detecting and reacting swiftly to early signs of problems. Whilst uncertainty can never be entirely eliminated, it can mostly certainly be contained, and that should be good enough. Ultimately this is a far more effective use of resources.

> ❝ Managing uncertainty often requires an approach which differs from conventional risk management ❞

It may be helpful to visualise the project as existing in a continual state of dynamic tension (see Figure 4). The accumulation of uncertainties continually tries to push the project off its planned path. If left unchecked, the problems may grow so severe that there is no possibility of recovering back to the original plan.

The project manager's role is to act swiftly to correct the deviations, setting actions to resolve issues, implementing contingency plans or nipping problems in the bud. This requires mindfulness and agility: mindfulness to be able to spot things going wrong at the earliest possible stage, and agility in being able to react swiftly and effectively to damp down the problems and bring the project back on track.

3.2 Uncertainty is an Attribute not an Entity in its Own Right

We often talk about uncertainties as if they are discrete objects when in fact uncertainty is an attribute of every aspect of the project. The 'object' model of uncertainty is unhelpful because it suggests that there are clusters of uncertainties hiding away in the darker corners of the project. If only we could find them, we could dispose of them and our project would be free of uncertainty.

This is a flawed point of view. Uncertainty attaches to every action or decision much like smell or colour does to a flower. The level of uncertainty may be strong or weak but collectively we can never completely eliminate uncertainty because the only project with no uncertainty is the project that does nothing.

Once this is accepted, it becomes pointless to attempt to manage uncertainty in isolation from everything else. A project manager cannot set aside a certain number of hours each week to manage uncertainty, it is inherent in every decision taken. Uncertainty cannot be compartmentalised.
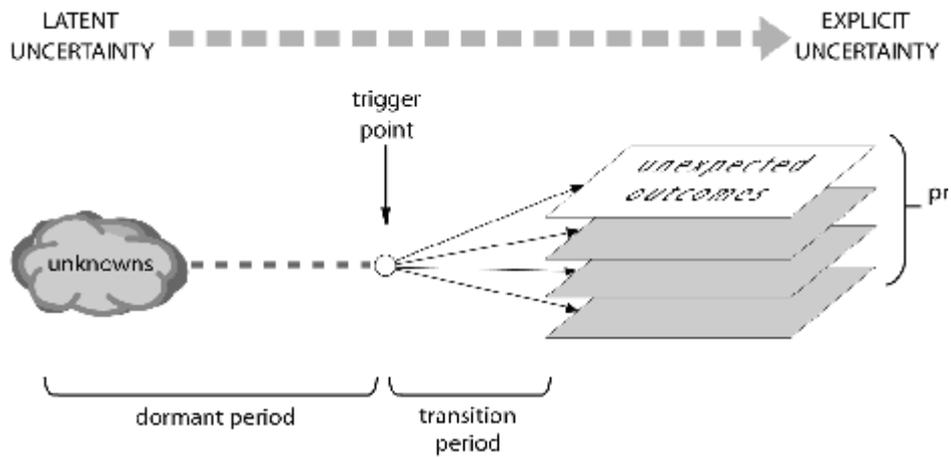
Figure 5: Collective Team Responsibility to react rapidly during the Transition Period is Key to minimising the Impact of Uncertainty.

“ A knowledge of the lifecycle of uncertainty helps to inform the different strategies which can be used at different stages of the lifecycle ”
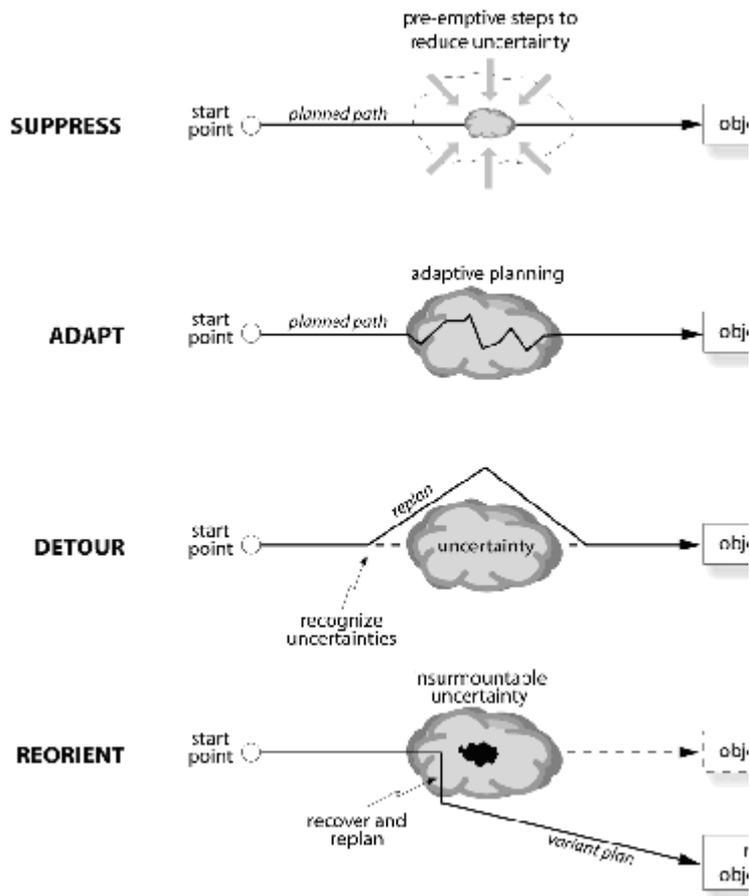

Figure 6: Four Possible Modes for confronting Major Uncertainty.

> **"** Naturally, no matter how good our understanding
> of the project's context, there will always be gaps **"**

It lurks in all project tasks, in their dependencies and underlying assumptions.

Alertness to any deviation from the norm is vital. A culture of collective problem ownership and responsibility is also important. All team members need to be capable of resolving issues within their domain as soon as they are spotted. The period between a trigger event and a full-blown crisis is often small, so there may not always be time to refer up the management chain and await a decision. The ability to act decisively – often on individual initiative – needs to be instilled in the team and backed up by clear lines of responsibility and powers of delegation. In time, this should become part of the day job for members of the team at all levels.

Project tolerances can sometimes mask emerging uncertainty. Thresholds need to be set low enough so that issues are picked up early in the uncertainty lifecycle, giving more time to react effectively. It also depends on the nature of the metrics being used to track progress, for example: number of defects appearing at the prototyping stage, individual productivity measures, number of client issues flagged, etc. Choose the metrics carefully. The most obvious metrics will not necessarily give the clearest picture (or the earliest warning) of emerging problems.

3.3 Put Effective Decision-making at the Heart of Managing Uncertainty

When faced with uncertainty, the project manager has several options available (see Figure 6). The project manager must decide how to act – either by suppressing uncertainty (perhaps through plugging knowledge gaps), or adapting to it by drawing up mitigation plans, or detouring around it and finding an alternative path to the project's goals.

Whichever action is taken, the quality of decision-making determines a project's survival in the face of uncertainty and is influenced by everything from individual experience, line management structures, to the establishment of a blame-free culture which encourages those put on the spot to act in the project's best interests with confidence. As the old adage says: *Decisions without actions are pointless. Actions without decisions are reckless.*

The most commonly used tactic against major uncertainty is to *suppress* it, reduce the magnitude of the uncertainty and hence the threat it represents. If this can be done pre-emptively by reducing the source of the uncertainty, the greatest benefits will be achieved. Avoiding uncertainty by suppressing it sounds like a safe bet – and it is, providing it can be done cost-effectively. As the first tenet states, reduction is the goal, not elimination. For novel or highly complex projects, particularly those with many co-dependencies, it may be too difficult or costly to suppress all possible areas of uncertainty.

By *adapting* to uncertainty, the project tolerates a working level of uncertainty but is prepared to act swiftly to limit the most damaging aspects of any unexpected events. This is a highly pragmatic approach. It requires agile and flexible management processes which can firstly detect emerging issues in their infancy and secondly, deal with them swiftly and decisively. For example, imagine a yacht sailing in strong winds. The helmsman cannot predict the strength of sudden gusts or the direction in which the boat will be deflected, but by making frequent and rapid tiller adjustments, the boat continues to travel in an approximately straight line towards its destination.

Given the choice, we should like to *detour* around all areas of uncertainty. Avoiding the source of uncertainty means that the consequences (that is, the unexpected outcomes) are no longer relevant to the project. Thus there is no need to take costly precautions to resolve unknowns or deal with their repercussions. Unfortunately, detouring around uncertainty is hard to achieve, for two reasons.

Firstly, many sources of uncertainty are simply unavoid-
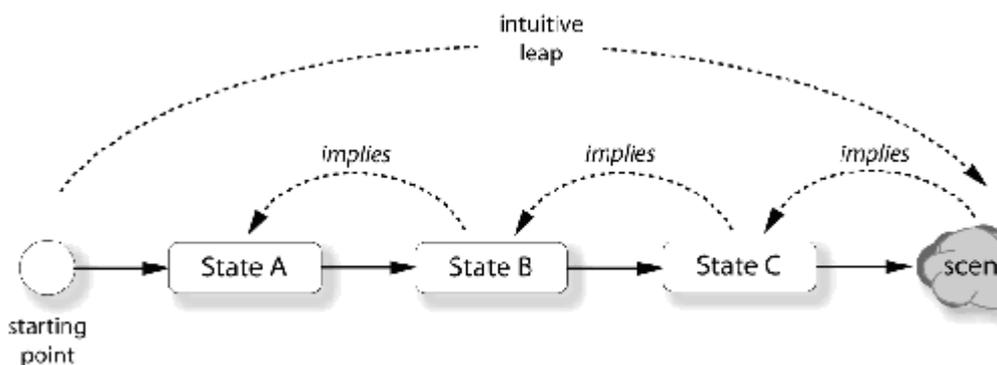

Figure 7: Making an Intuitive Leap to visualise a Future Scenario.

able, or the avoidance measures are too costly. Consider the example of a subcontractor who, it later transpires, may be incapable of delivering a critical input on time. We could detour around this uncertainty by dismissing the subcontractor in favour of some competitor who can provide a better service. This will mean cancelling existing contracts, researching the marketplace and renegotiating commercial terms with an alternative supplier – all time-consuming and potentially costly activities – and with the risk of being no better off with the alternative supplier.

Secondly, detouring only works for quantifiable uncertainty (the 'known unknowns'). Unfathomable uncertainty may well strike too rapidly to permit a detour.

Our final option is *reorientation*. This is a more dramatic form of detour where we aim for a modified set of objectives in the face of insurmountable uncertainty. Highly novel projects sometimes have to do this. To plough on in the face of extreme uncertainty risks total failure. The only alternative is to redefine the goals, that is, reorient the project in a way that negates the worst of the uncertainty. This is not a tactic for the faint-hearted. Convincing the client that a project cannot be delivered as originally conceived is no easy task. But it is worth asking the question, "Is it better to deliver something different (but broadly equivalent) than nothing at all?"

3.4 Uncertainty encompasses both Opportunity and Threat

It is important to seize opportunities when they arise. If some aspects of a project are uncertain, it means there are still choices to be made, so we must choose well. Too often, the negative consequences dominate the discussion, but perhaps the project can achieve *more* than was planned, or achieve the same thing by taking a different path. Is there a chance to be innovative? Project managers must always be open to creative solutions. As Einstein said, "We can't solve problems by using the same kind of thinking we used when we created them."

All approaches to dealing with uncertainty depend to a greater or lesser extent on being able to forecast future events. The classic approach is sequential: extrapolating from one logical situation to the next, extending out to some point in the future. But with each step, cumulative errors build up until we are no longer forecasting but merely enumerating the possibilities.

Suppose instead we don't try to forecast what *will* happen, but focus on what we *want* to happen? This means visualising a desired outcome and examining which attributes of that scenario are most valuable. Working backwards from this point, it becomes possible to see what circumstances will naturally lead to this scenario. Take another step back, and we see what precursors need to be in place to lead to the penultimate step – and so on until we have stepped back far enough to be within touching distance of the current project status. (See Figure 7).

This approach focuses on positive attributes (what are the project's success criteria?) not the negative aspects of the risks to be avoided. Both are important, but many project managers forget to pay sufficient attention to nurturing the positive aspects. By 'thinking backwards' from a future scenario, the desired path often becomes much clearer. It is ironic that 'backward thinking' is often just what is needed to lead a project forward to successful completion.

3.5 Meet Uncertainty with Agility

Perhaps the best defence against uncertainty is to organise and structure a project in a sufficiently agile fashion to be resilient to the problems that uncertainty inevitably brings. This manifests in two ways: how fast can the project adapt and cope with the unexpected, and how flexible is the project in identifying either new objectives or new ways to achieve the same goals?

One approach is to ensure that the project only ever takes small steps. Small steps are easier to conceptualise, plan for and manage. They can be retraced more easily if they haven't delivered the required results or if it becomes clear they are leading in the wrong direction. Small steps also support the idea of *fast learning loops*. For instance, a lengthy project phase reduces the opportunity to quickly feedback lessons learned. If the project is too slow to respond, it may fail under the accumulated weight of uncertainty.

More iterative ways of working are becoming increasingly common and do much to increase the agility of a project. A feature of monolithic projects (i.e. those which do not follow an iterative strategy) is the assumption that everything proceeds more or less as a sequence of tasks executed on a 'right first time' basis. Generally speaking, more effort is directed at protecting this assumption (for example, by analysing and mitigating risks which may threaten the task sequence) than on planning for a certain level of rework. In contrast, by planning to tackle tasks iteratively, two benefits are gained: firstly, early sight of unfathomable issues which wouldn't otherwise surface until much later in the schedule, and secondly, greater opportunity to make controlled changes.

Finally, an agile project is continuously looking for ways to improve. A project which is unable (or unwilling) to learn lessons is destined to repeat its early mistakes because it ignores opportunities to learn from the unexpected. Some lessons are obvious, some require much soul-searching, brainstorming or independent analysis. What matters above all else is that the improvements are captured and disseminated and the changes implemented, either in the latter project stages or in the next project the organisation undertakes.

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