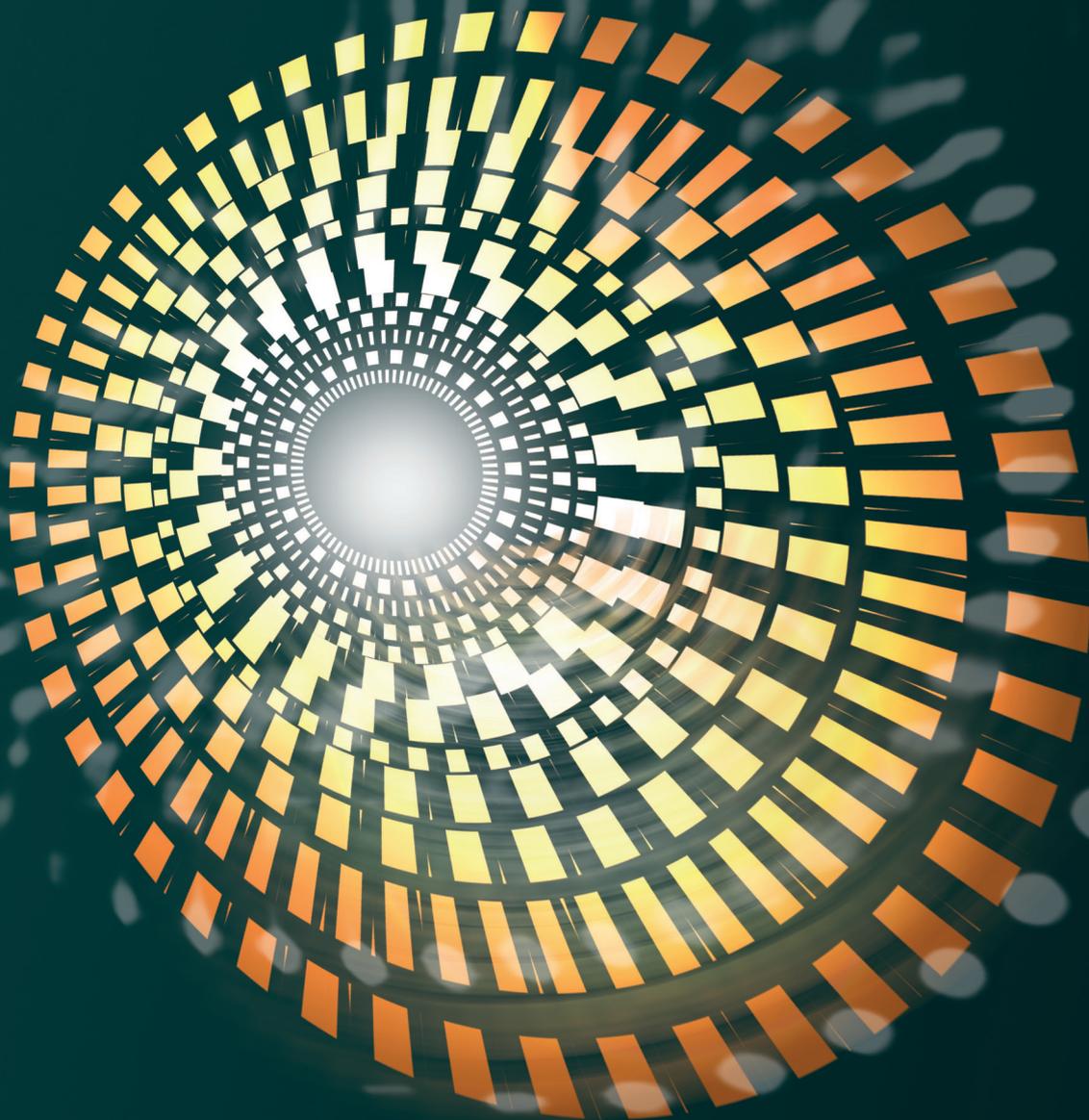


## Uncertainty and risk - can you spot the difference?

The future health of your organisation may depend upon it.



“Today’s fast changing world creates more uncertainty for organisations - and makes it harder for them to understand where new risks are going to come from”.

Black swans turn grey - The transformation of risk”. PWC January 2012

“Companies tend to ignore one complication along the way: They can’t develop models of the increasingly complex environment in which they operate. As a result, contemporary strategic-planning processes don’t help enterprises cope with the big problems they face. Several CEOs admit that they are confronted with issues that cannot be resolved merely by gathering additional data, defining issues more clearly, or breaking them down into small problems. Their planning techniques don’t generate fresh ideas, and implementing the solutions those processes come up with is fraught with political peril. That’s because, I believe, many strategy issues aren’t just tough or persistent—they’re ‘wicked.’”

John Camillus “Strategy as a Wicked Problem” HBR 2008

### **About the Author**

Dr Bruce Garvey is the CEO and founder of Strategy Foresight Limited (SFL), a specialist technology company dealing with problem structuring for highly complex issues occurring under conditions of uncertainty and complexity. Much of the development work that has gone into SFL’s technology emanated from Bruce’s research within a PhD research programme at Imperial College London. This addressed problem structuring and decision support methods as pertaining to creativity and innovation, technology forecasting, futures, scenario planning and systems uncertainties in the engineering/design and other sectors. Bruce’s specialist knowledge is complemented by over 40 years’ experience in both the major corporate and SME sectors, performing a wide range of roles as a senior business executive including company director (plus non-executive), mentor, advisor and consultant.



## The old new kid on the block

Recent situations in the UK and the wider world, such as Brexit, the Trump Presidency, the NHS hacking and security issues emanating from the recent UK terrorist events are evidence of forecast-driven decision making being challenged by complexity and uncertainty combined with limited foresight. Indeed, organisations, their senior management and policy makers, have had to adjust their thinking that not everything can be determined by allocating a probability based estimate.

Faced with this ever-changing situation most organisations and their decision makers are having to confront such issues by asking questions such as:

- How can I handle uncertainty and help mitigate strategic and operational risks?
- How do I get to grips with both internal and external operating environments impacted by high levels of uncertainty and complexity?
- What existential risks should I be aware of?
- Do I need to structure a problem before thinking about solving it?
- Are there things I haven't thought about but should be aware of?
- How can I generate new yet viable solutions that will help improve performance?
- How do I keep my organisation on its toes in a "wicked" world?

The introductory quotations above, although spanning the last decade are even more relevant today. "Uncertainty" is no longer a conceptual slogan but a reality we are living through. Do we need an alternative approach to help mitigate the impact of this new world - and do we really understand the difference between Uncertainty and Risk?



## Modern day challenges

The article by PWC from which the first of our quotations comes, highlights that the risk landscape organisations now face is changing and that it is “often difficult for them to define what’s behind the changes, or how they should respond to them”.

PWC claim that three main shifts have occurred.

- 1.** Current risk frameworks and processes are no longer giving them the level of protection they need.
- 2.** They are seeing rapid increases both in the frequency of risk events and that such impacts are ‘contagious’, and can infect different categories of risk, notably ‘catastrophic’ risks.
- 3.** Finally, boards feel they are spending too much resources on current risk management processes, rather than moving quickly and flexibly to identify and tackle new risks. In other words, operational imperatives override strategic ones - never getting out of the loop.

This last point is reinforced by the argument that of three main categories of risk, Financial, Operational and Strategic, companies have generally addressed the first two risks but have focussed less on strategic risk (described as made up of externally derived components such as economic, political and other environmental factors). PWC state that “they regarded risk and strategy as separate from each other, rather than seeing risk-taking as a key part of value creation in any business”. This reinforces the Camillus position expounded in the second introductory quotation.



# How to position Uncertainty in relation to Risk

Already in reference to the PWC paper we see the confusion as to how we should address uncertainty as opposed to risk - the latter term being regularly used to include uncertainty. This confusion is at the root of many of our preconceptions about what uncertainty is and what risk is. Uncertainty and Risk lie along a spectrum, which includes of course, Certainty. A brief examination of the semantics involved shows that:

Certainty occurs when it is assumed that perfect information exists and that all relevant information to a problem is known. In reality it can be argued that the veracity of perfect information can be challenged and that the relevance of the information can only be assumed.

Risk on the other hand indicates that partial information (often involving metrics), is available so that when future events or activities occur they do so with some measure of probability. Alternatively, risk can be defined as the probability or threat of a damage, injury, liability, loss or negative occurrence, caused by external or internal vulnerabilities, and may be neutralized through pre-meditated action (risk management).

Uncertainty implies incomplete information where some or all of the relevant information to a problem is unavailable. Uncertainty can also be explained as being a situation where the current state of knowledge is such that:

- The order or nature of things is unknown.
- The consequences, extent or magnitude of circumstances, conditions, or events is unpredictable.
- Credible probabilities to possible outcomes cannot be assigned.
- A situation where neither the probability distribution of a variable nor its mode of occurrence is known.

As far back as 1921 Frank Knight in his seminal work "Risk, Uncertainty, and Profit", established the distinction between risk and uncertainty - a distinction which still is the most concise but seems to require discovery by every new generation of management.



**“... Uncertainty must be taken in a sense radically distinct from the familiar notion of Risk, from which it has never been properly separated. ... The essential fact is that “risk” means in some cases a quantity susceptible of measurement, while at other times it is something distinctly not of this character; and there are far-reaching and crucial differences in the bearings of the phenomena depending on which of the two is really present and operating. ... It will appear that a measurable uncertainty, or “risk” proper, as we shall use the term, is so far different from an un-measurable one that it is not in effect an uncertainty at all.”**

Knight F. (1921)

As one moves, away from the Certain towards the Uncertain end of the spectrum, probable outcomes are reduced to being only possible outcomes and where information, especially in its quantitative form becomes increasingly unavailable and/or not relevant. Thus, the challenge for management is to accept that not everything can be explained as a probabilistic measure which can be quantified (comfortable as that may be). In simple terms, “Risk” can be quantified (via probabilities), “Uncertainty” cannot, as it is not measurable. Other structural components creating difficulties for practitioners reside at the system level and include complexity and interconnectivity.



# The Challenge of New Threats

The challenge is not only new threats but the behavioural reactions by organisations to these threats - it being a daunting prospect to accept that the old methods are no longer offering sufficient support to decision makers.

**Quoting a joint Cass Business School/Airmic study called "Roads to Ruin - a Study of Major Risk Events" the PWC paper highlights that many risks "are both beyond the reach of current risk analysis techniques, and also beyond the remit and expertise of typical risk managers.**

Unidentified and unmanaged, these risks remain unnecessarily dangerous". In addition, the increasing interconnectivity of today's world exacerbates such risks.

Perceptively, PWC acknowledge that even where risks are known, they are surrounded by uncertainty compounded by the way rapid and non-linear way global risks emerge - making such risks difficult to identify, let alone quantify. Thus, PWC continue:

- Under current risk management thinking, a risk that cannot be identified cannot be managed. In the new environment, this view of risk becomes a major problem. There is a need to develop more sophisticated approaches to risk data collection and analysis.
- Collecting more data does not necessarily give more protection as risk data overload makes it harder to see to the heart of an organisation's risk issues. The changes in the wider environment means the value of a company's own historical data - albeit useful as an indicator of future risk events - needs to be supplemented.
- Consequently, some organisations are beginning to question if these new 'risks' are really risks at all, but something different: a new and unprecedented level of uncertainty that goes beyond traditional concepts of risk, largely resulting from rising global connectivity. (The position expounded by Frank Knight back in 1921 is noticeably relevant here).
- What matters is the growing size, unpredictability and variety of the threats to organisations and their stakeholders. In PWC's view businesses need to respond to these changes by identifying and adopting new, more holistic and more agile approaches to managing risk and uncertainty.



## Profiling Uncertainty and Risk

The positions of Uncertainty and Risk across the Risk Spectrum (Uncertainty to Risk to Certainty), are not fixed; the boundaries are often occluded. Outcomes or events, whether they reside at the uncertain or risk end of the spectrum, can be refined by determining their position in relation to axes based on predictability and visibility. How can a matrix using these axes help us to identify different levels of risk and uncertainty? More importantly, can such a schema indicate what methods and tools should be deployed to better address the different environments thrown up by the matrix?

### Event Predictability

Events can be Predictable or Unpredictable. By “predictable” is meant “to be made known beforehand” or simply, “capable of being foretold”. The ability to identify how well an outcome can be predicted is dependent on how much control we have in making an event happen and what historical data (or experience) is available which in turn allows us to make varying levels of probability in the confirmation that an outcome, can happen. As identified above, it is important to recognise that the matrix cells are not discrete but rather contain occluded transitions.

### Event Visibility

Can, “what type of event that may occur”, be identified? How different is event “Visibility” different from “Predictability”? Visibility implies being able to determine what type of event may impact us as opposed to the likelihood of that event occurring. This requires identification in greater detail of the kind of events, which can have an impact. This brings into play the willingness to seek out potential “weak signals” which if not addressed can manifest themselves as future unintended consequences (good or bad).

In addition to predictability it is important to identify (make visible) those events which are likely to have the greatest impact from a subjective standpoint - tempered by the probability of such an event happening.



Of course, both elements are interrelated - some events are predictable and identifiable whilst at the other extreme there exist events that are neither identifiable nor predictable. The relationship between event visibility and event predictability can be illustrated in the following table:

Identifiability Predictable	Identifiable	Not Identifiable
Predictable	<b>Q1. The Known Known</b> Probabilistic Risk Assessment <ul style="list-style-type: none"> <li>• Actuarial Methods</li> <li>• Business Continuity</li> <li>• Routine Contingency Planning</li> </ul>	<b>Q2. The Known Unknown</b> General Contingency Planning <ul style="list-style-type: none"> <li>• Inevitable Surprises</li> <li>• Emergency Response Planning</li> </ul>
Unpredictable	<b>Q3. The Unknown Known</b> Specific Contingencies <ul style="list-style-type: none"> <li>• Scenario planning and identification and evaluation</li> <li>• Policy response</li> <li>• Pseudo Black Swans (Grey Swans)</li> <li>• Disruptive Business Models</li> </ul>	<b>Q4. The Unknown Unknown</b> Terra Incognita <ul style="list-style-type: none"> <li>• Cataclysmic</li> <li>• True Black Swans</li> </ul>

Uncertainty/Risk Matrix: Occlusions (Garvey B) - areas within dotted cloud are known as the "Uncertainty Badlands".



Thus, those events which, any decision maker must take into account, are represented in the top left hand:

#### Quadrant 1: Predictable & Identifiable (Known knowns).

These events are likely to be extrapolations of events and trends that have already occurred, such as the likelihood of further regulatory and compliance measures. In this quadrant, information required to help make a decision is likely to be in formal policy documents, methods and calculations.

#### Quadrant 2: Identifies predictable events not yet identifiable (Known Unknowns)

A typical example would be the recent terrorist acts in Manchester and London. The public had been warned a number of times by the police and security forces that such an event would occur (i.e. it was predictable), it was just a matter of when. These events have been called, "Inevitable Surprises" by Peter Schwartz (2003): (other examples being that of a major earthquake along the San Andreas fault in California or the next overdue major eruption of Vesuvius). Such events, being predictable but not yet visible can be addressed by advanced, foresight-based contingency planning or emergency response so that when they do happen the consequences can be mitigated to some degree.

#### Quadrant 3: Unpredictable & Identifiable (Unknown knowns)

In many cases this cell is a flipped version of its Predictable/Not Identifiable partner, except that the level of probability is far less certain. The level of certainty is reduced not only by how far in the future an event might occur but be exacerbated by the numerous permutations influencing the outcome of an event in the intervening period. An example might be that confronting analysts as to what will happen in the Middle East over the coming 12 months. We can identify the areas of concern - Iran/Saudi tensions, Yemen, Libya and Syria but the outcomes are highly unpredictable due to the variety of different stakeholders with interests in the region - each with their own agenda (the countries themselves, USA, Russia, UK, France, China, Turkey, UN). Alternatively the potential of new business models to disrupt need to be considered.

Note: Quadrants 2 and 3 require an open-mindedness not always present in some organisations. In addition to the maintenance of entrenched paradigms by various vested interests, decision makers are required to



enter the “zone of uncomfortable debate”, the ZOUD which many organisations, policy makers, designers and practitioners, find difficult to confront. The cataclysmic nature of such events makes for uncomfortable reading - thinking about the unthinkable, which is why, when they occur, they are too readily deemed to belong to Quadrant 4: in the vast majority of cases they are not and just demonstrate a lack of foresight.

Quadrant 4: Unpredictable & Not Identifiable (Unknown unknowns).

Events here move into the realm of unknown territory “Terra Incognita”. At the most extreme these are Rumsfeld’s “unknown unknowns” - the ones we don’t know we don’t know. Such events have also been called “Black Swans”. As defined by Taleb the term is a true unknown unknown. However, the reference to an event being “a Black Swan” has been hi-jacked and used to justify what, in essence, is a straightforward lack of foresight and proper due diligence. Post the 2008 financial crisis commentators, bankers and financiers alike, were using the term “Black Swan event” as a reason as to why the crisis could not have been foreseen.

This is a misrepresentation of the term as the event was foreseen by numerous but unfashionable commentators such as Roubini and Rajan who highlighted the probability of such an event in 2005, but who were just ignored. 2008 was not a true “black swan event”. Similarly, it should be pointed that events such as the “Kodak moment” is not a black swan event - it could be foreseen and demonstrates poor judgement by management.

These events can be described though as being “pseudo black swans” or even “grey swans”. It can be argued that if we can think it - it is possible, and if we can’t then it is an “unknown unknown” or “true black swan” event and thus time should not be spent on worrying about the latter. Hence the true position of such events is within Quadrants 2 or 3. Anything else, no matter how improbable, does qualify for consideration, and methods should be adopted which might in some way allow us to recognise such an eventuality and to develop contingency plans to mitigate their impact.



## So, what next?

In the end, management has to accept reality and realise that in order to avoid inevitable, often unpleasant, let alone unknown, surprises, and the “anomie” associated with such outcomes, it has to be more readily amenable to acknowledging that precision and the future are incompatible terms.

In the above matrix, the areas within the “cloud” bordered by the dotted line indicate where varying levels of Uncertainty intervene - the “Uncertainty Badlands”. This ranges from some areas of Quadrant 2 (Known Unknowns) - and asks the question “Is enough foresight being shown”. A failure to have suitable responses in place is less due to being exposed to uncertainty itself but a failure in imagination. Quadrant 3 (Unknown Knowns) is probably the most pernicious - we think we know what or where the problem is or might occur but can we handle the inherent complexities or do we even have the tools to address such complexity based uncertainty? Group-think and dogma based policy are the real enemies here and the issue is whether the stakeholders themselves are prepared to explore outcomes which may produce uncomfortable truths. Quadrant 4 is in many ways the easiest to respond to, as in its purest form it is difficult to react to something not only beyond our imagination but beyond our cognition. However, being aware of the unknown unknown as a concept can help us to continually challenge the boundaries of our knowledge and awareness - science fiction novels have come closest to pushing these boundaries and giving us an insight into phenomena at the very extremes of our cognition.

Stratagems (but not necessarily solutions) to address this conundrum fall into two main categories - behavioural and being prepared to seek out alternative methods and tools to mitigate the risk of working in an uncertain world.

### **The behavioural challenges include:**

- Avoiding the illusion of control: this is psychologically disturbing to many decision makers.
- Acknowledging uncertainty (as being different from risk).
- Implementing protective strategies and being prepared: contingency planning, emergency response, risk management processes.



- Adopting proactive strategies: via building in redundancy into the strategy (i.e. a little fat can be good for you).
- Diversifying options (i.e. stakeholder input) to take into account forecast errors. Some organisations struggle to come to terms with such a heterodox approach, preferring to protect their functional boundaries at all costs.

The term “alternative methods” to help mitigate the impact of uncertainty is preferred to “new methods”, as many of them are not necessarily new but have been around for a number of years, if not decades, and have been lurking in the shadows of the management tool-kit. A number of them have been used largely within defence organisations and have not made the transition across from military strategy to business strategy.

Methods include for example: Red teaming, alternative analysis, analysis of competing hypotheses, problem structuring methods, including the strategic choice approach, robustness analysis, adaptive planning systems, systems thinking, backcasting as well as morphological analysis.

Moreover, all of these methods are generic in that they can be readily adapted to most organisation and business sectors. Vitally, they all have a place in addressing the “Uncertainty Badlands” of quadrants 3, 4 and 2.

An accompanying white paper in this series will address how this set of methods can be introduced so as to re-enforce management practices when confronted with uncertainty.



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## About Strategy Foresight Ltd - Decision Support for the 21st Century

Strategy Foresight Ltd is an innovative technology company that develops solutions to help organisations improve their decision making under conditions of uncertainty and complexity. These solutions support senior leadership tasked with a critical series of difficult-to-quantify, complex and interconnected problems. The decision-support software platform combines qualitative and quantitative data into a single easy-to-use visually interactive tool that can be used by any organisation. It has been deployed by several major organisations including the Life Science, Engineering and Defence sectors, NATO being one of its clients. Uncertainty is ever-present in industries such as pharma, aerospace defence and petrochemical with their long product development times and massive capital outlay, however, we are living through an “unusual level of uncertainty” to quote Ben Bernanke, the former chairman of the US Federal reserve. The methods and processes Strategy Foresight deploys, a form of “strategic options analysis”, helps structure problems and support decision making, notably when they are complex, “wicked” and inherently contain high levels of uncertainty. It is particularly well suited in assisting decision making when addressing the inherent uncertainties and risks associated with early stage investment strategy formulation. This acts as a “strategic insurance vehicle” to enhance management’s ability to mitigate the investment risk under such circumstances. By systematically structuring and examining the total set of possible relationships in a multidimensional, usually non-quantifiable, problem space the software supported process enables the problem to be reduced to a much smaller set of viable options or solutions. This helps to reduce the chance that events will play out in a way that management has not previously imagined and considered.

Whilst developing innovative strategic choices, the product visually displays in real time the elements of a decision including inputs, outcomes and goals, providing interactive options analysis, provides the user with an audit trail as decision validation, and crucially through its stakeholder representation, allows users to take ownership of the problem and outcomes.





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