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Thinking Futures

Strategy at the Edge of Complexity and Uncertainty

LANNOO CAMPUS

Cover image: An astrolabe made by the astronomer Abu Bakr ibn Yusuf in the year 1216 AD or 613 AH in the city of Marrakesh. Museum Paul Dupuy, Toulouse, France.
Photo: © 2002, Nicolas Brodu.

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Astrolabe

The cover image presents an astrolabe made by the astronomer Abu Bakr ibn Yusuf in the year 1216 AD in the city of Marrakesh.

The astrolabe is an ancient astronomical computer for solving problems in such diverse areas as astronomy, astrology, navigation, surveying and timekeeping. Its name is derived from the Greek word *astrolabos* (ἀστρολάβος), a combination of '*astron*' meaning 'star' and '*lambanein*' meaning 'to take'. The Oxford English Dictionary translates 'astrolabe' as 'star-taker', since it takes measurements of the positions of stars. More than two thousand years ago, the Greek astronomer Hipparchus of Nicaea (c.190 – c. 120 BC) already knew the principles of the astrolabe and by the year 800 the Islamic world had already developed numerous sophisticated applications. Its use was introduced to Europe from Muslim Spain (Al-Andalus) in the early 12th century. In Europe, the astrolabe became the most important tool for astronomers until the middle of the 17th century, while in the Arab world its use continued until the 19th century.

The 18th century Radcliffe Observatory of Green Templeton College in Oxford was among the first modern scientific observatories in the world. Its construction was inspired by the *Tower of the Winds* in the Roman Agora in Athens. Today, the University of Oxford still possesses one of the largest collections of astrolabes in the world, conserved at its Museum of the History of Science.

Astrolabes are outstanding scientific instruments for the solution of complex problems relating to the *navigation of unchartered territory*, while its crafting and use requires a vast multi-disciplinary knowledge. Consequently, astrolabes have many things in common with complexity theory and futures research, but also with Green Templeton, the Oxford Martin School and the University of Oxford.

THINKING: the act of producing thoughts or the process of producing thoughts. Thinking allows humans to solve problems, to make sense of, interpret, represent or model the world they experience, and also to make predictions about that world. It is therefore helpful to an organism with needs, objectives and desires, as it makes plans or otherwise attempts to accomplish those goals.

FUTURE: after the time right now; the time after the current time; the next time; an action or condition that has not yet happened; an undefined moment in time that still needs to take place; a situation of someone or something at a later date.

STRATEGY: from the Greek word *stratēgia* (στρατηγία) meaning 'generalship'; based on the word *stratēgos* (στρατηγός) meaning 'army leader', which is a combination of *stratos* meaning 'army' and *agein* meaning 'to lead'. A plan of action designed to achieve a long-term or overall aim.

STRATEGIC – important or essential in relation to a plan of action; highly important to or an integral part of a strategy or plan of action; highly important to an intended objective.

COMPLEXITY: something complex. **COMPLEX** – difficult to understand for being intricate or involved; complicated.

UNCERTAINTY: the state of being uncertain. **UNCERTAIN** – not able to be relied on; not known or definite; not completely confident or sure of something.

SCENARIO: plausible, coherent stories about the future aimed at making sense of uncertain issues and clarifying strategic options for decision-makers. Scenarios provide a non-threatening environment for exploring multiple perspectives, creating a shared language and leading to understanding and trust.

Announcer; Augur; Futurism; Futurology; Chance; Tomorrow; Opportunity; Oracle; Perspective; Prediction; Prophet; Prophetic; Prophecies; Prophesy; Prognosis; Scenario; Scenario-based thinking; Scenario learning; Scenario planning; Scenario studies; Science fiction; Future; Future scanning; Future image; Future thinking, Future planning; Future projection; Future engineering; Future research; Future scenario; Future expectation; Future event; Promulgator; Perspective; Horizon; Expectation; Vision; Visionary; Predict; Predictor; Prospect; Look ahead; Prompter; Anticipate; Astrologer; **S**eer.

To
Anne-France and Marie-Charlotte Gosselin
D.P.G.

For
Matthias, Hannah, and Andreas Tindemans
B.T.

Contents

Figures

Tables

Prologue

One evening in the autumn of 2000, Professor David Anthony King FRS entered his office in the Department of Trade and Industry in Whitehall, central London, little knowing what catastrophic document was destined to land on his desk in the near future.

It was October 2000, and King had just been appointed as Chief Scientific Advisor to Her Majesty's Government and Head of the Government Office for Science for the United Kingdom. This was a prestigious function with far reaching powers, since he reported directly to the Prime Minister and the Cabinet. In this function he was able to work on a more scientific approach for the great challenges facing the country. There was great hope that he could overcome the unavoidable daily political bickering and present an agenda based on science and studies.

David King is a top scientist at the chemistry department of the University of Cambridge and this new task suited him perfectly: organizing a scientific basis for economic policy in the broad sense of the word.

But the file that ended up on his desk a few weeks later would make him doubt his faith in this approach. The problem was gigantic: a local outbreak of foot-and-mouth disease threatened to become a major epidemic. David King had the opportunity to demonstrate his new approach. He summoned his colleagues and gave them instructions: firstly, they had to systematically follow up and map out the facts; next, they had to collect data of previous comparable crises; finally, they needed to determine the possible impact. All of this information would then form the basis of a well-founded approach that would be in proportion to the possible scale of contamination and damage.

So much for the theory; in practice, however, it was completely different. Not only were there constant reports of new outbreaks of the disease at new sites but there was an even worse conclusion that could no longer be avoided: there was no system to map out the possible contamination. To make matters worse, the available facts about previous crises were inadequate. This crisis was fundamentally different from any other. Even the expertise of academic experts in computer models for epidemics could not provide the necessary answers. They felt constantly one step behind events, and the crisis gradually assumed unknown proportions, with international consequences and huge economic loss for the farmers.

Al Gore (l) – Sir David King (r).
7 July 2009 – Inaugural World Forum on Enterprise and the Environment.

© 2009 Photo SSEE – Used with permission of the Smith School of Enterprise and the Environment (SSEE), University of Oxford.

Professor King, founding director of the *Smith School of Enterprise and the Environment*[1] at the University of Oxford, looked back on this turbulent period during a workshop at the end of 2009.

> *"It was hell. I swore I never want to go through this again. The situation changed every day. The speed at which the epidemic spread had never been seen before. Data and models from the past were insufficient. This was a new situation. Models based on historical data were as good as worthless because there were too many new uncertainties. The complexity got continuously bigger and we were unable to propose well-founded measures. In short, I had nothing to base this serious policy on."*

Methods and techniques from the past were inadequate for such new and unseen challenges. Better methods needed to be found in order to solve these *wicked problems*. And that is the focus of this book: the need for a new approach and the necessity to implement that approach as a decision-making process. As we shall see, this is not only relevant for problems relating to the health of British livestock.

Chapter 1
Thinking about the unthinkable

"In order to be able to draw a limit to thought, we should first have to find both sides of the limit of what is thinkable (i.e. we should have to be able to think what cannot be thought)."[2]
Ludwig J. Wittgenstein (1889-1951)

$e^{i\pi} + 1 = 0$
Leonard Euler (1707-1783)[3]

Introduction

The 21st century started with a number of major changes. The financial crisis was not the only wake-up call. Many challenges of an unprecedented global scale have been sent to try us. The shift of economic activity to new growth countries, the pandemic proportions of ailments in humans and animals, the ageing population, migration flows, climate change, the meteoric technological evolutions and the scarcity of raw materials, energy and water – to name only a few – will cause shocks that will provide both new challenges and new opportunities. A stable environment seems to be a thing of the past. Our new environment has three distinct attributes that will increase as time progresses: rate of change, uncertainty, and complexity.

The analyses, the instruments and the methods that were used in the past to prepare for the future no longer work in this new context.[4]

Moreover, the promise of the information society is not being fulfilled. While the economic and political players accept and apply the latest news and the most

recent data, the current crisis shows that the information available remains inadequate. It is inadequate to understand what is going on, inadequate to protect what exists and inadequate to create a better future.

The key lies in the correct interpretation or *sensemaking*[5] of the changes, in understanding and being able to place the events in this new environment. It also lies in the interpretation of *weak signals* that can help to understand what is coming up and so better prepare for the future. However, the key lies neither in the quantity nor in the speed with which information is available.

We must learn to observe, watch, interpret and understand, again.

Preparing the future in such an environment requires a different and new approach. In short, as the experience of Sir David illustrated, extrapolations of what has worked in the past and models that depart from a stable environment are no longer sufficient.

This book aims to give the reader insight into a new approach, a new way of future thinking. This is a powerful and academically based method to interpret an unpredictable, changing and complex environment. The term *future thinking* is used for a collection of methods, such as scenario-based thinking, new leadership and strategic conversation. We will see that the application domain is wide, ranging from political policy and business strategy to innovation and entrepreneurship. In all these domains, the disciplined application of future thinking can offer a competitive advantage in each new environment.

Scenario-based thinking is – in a nutshell – an approach that sharpens the skill to develop alternative futures and to test the current model of an organization. This approach brings hidden premises from the past to the surface and highlights them with alternative assumptions. The approach is used to anticipate future uncertainties. It offers a powerful method to proactively identify opportunities and to create – in the form of a new policy orientation – the renewal of an organization to adapt to its environment, a better strategic approach, or the conquest of new markets with new creative combinations. This approach is not limited by implicit and explicit assumptions from past hypotheses, which all too often turn out to be a dominant factor in the downfall of successful organizations.

In addition, 'future thinking' offers the instruments to discover the relationships between different and, at first glance, seemingly unconnected elements. It bridges

the boundaries between experts, strategists and practitioners; in short, between all the relevant stakeholders. In this way, the knowledge of all these actors can be shared in a productive way to accelerate implementation when there is change. This makes it possible to anticipate an uncertain future with greater accuracy.

It is the best and perhaps the only reliable way to create a new model of leadership in each new environment and to discuss the unthinkable in order to resolve conflicts. We will discuss this in more depth later in the book. First, we will look at the origin of 'future thinking': where does it come from?

History

The origins of future thinking

Throughout history, people in leading, controlling or commanding positions have always shown keen interest in obtaining knowledge about the future. The biblical kings had their prophets, the Persian sultans their viziers, the Greek city-states their oracles, the Romans their divines, the Renaissance kings their astrologers and modern captains of industry their consultants and (sometimes) investment bankers. Even the Mafia has its *consiglieri*!

The first writings that attempted to define alternative futures were a form of essay that either described a place where everything was as bad as possible (*dystopia*) or, on the contrary, where everything was as good as possible (*utopia*): a perfectly happy state of being, such as Plato's ideal state in his *Politeia*.

The origin of strategic scenario-based thinking as a strategic planning tool is to be found in the military sciences. Early examples of the military use of scenario-based thinking usually took the form of simulations or war games. The modern approach to handling uncertainty through the use of different alternatives – today we would call these 'scenarios' – was first documented as being employed by German military strategists. The 19th century writings of General Carl von Clausewitz[6] (1780-1831) and General Helmuth von Moltke[7] the Younger (1848-1916), two Prussian military strategists to whom the first formulation of the principles of strategic planning is attributed, reveal that scenarios were used to present a broad range of future eventualities to support strategic decision-making.

Modern 'strategic scenario-based thinking' or 'scenario planning' as known and applied today, only emerged only after the Second World War. Its origins date back to the early 1950s and it evolved simultaneously in two separate geographic centres: the United States and France. For a schematic overview of the different disciplines that have now evolved after more than 65 years of research and development, please refer to Figure 1 at the end of this chapter.

Shortly after the Second World War, the U.S. *Department of Defense* (DoD) faced a special challenge: what kind of defence system was needed for a safer future? This implied the need to answer a secondary question as well: on what future defence system will the necessary military strategy and doctrine be based? Making a choice between the possible different types of defence systems, deciding which should be eligible for further development and public funding, was for various reasons a difficult task: the war had left an *uncertain* political situation, which still prevailed when the world entered the Cold War period in the years after 1946.

The U.S. and Great Britain, concerned with their own post-war economic problems, had remained extremely grateful to the Soviet Union for the active role they had played in ending the Second World War. However, it was the historic speech by Sir Winston Churchill (1874-1965) at Westminster College, Fulton, U.S. on 5 March 1946 that captured and emphasised the gradual change in the way the democratic West was starting to view the dictatorial communist East. The West no longer saw the Soviet Union as an ally, but as a growing military and ideological menace for freedom and democracy. Many contemporary historians consider 5 March 1946 as the beginning of the Cold War (1946-1991). Nevertheless, in 1946 many still ridiculed Sir Winston for his prophetic warning that an *iron curtain*[8] would divide the European continent.

In these circumstances, what would be the nature of future conflicts? Which military systems would be most adequate for dealing with them? In addition, the last war had also led to an unprecedented progress in science, thereby increasing the complexity of weapon systems. Consequently, the risk inherent to complex R&D-developments also increased: would this lead to the results we wanted and would these systems actually work? There was also additional uncertainty about the effectiveness of weapon systems, because this largely depended on what other nations were developing during the same period.

In short, how could the right decisions be made in this uncertain context for the selection of the defence systems to be further developed? There was clearly a need for better methods to make these decisions. Two types of need were of particular concern:

- The need for a method to achieve a reasonable consensus on future evolutions among the many and varied opinions of the military and political experts. The greater the number of experts, the greater the number of different opinions;
- The need for simulation models for various possible future environments, so that different political options and their consequences could be tested.

The first need inspired the development of the Delphi method; the second need led to the development of 'systems analysis', which in turn led to the development of 'game theory', 'war games' and, ultimately, to the scenario method. It was the *RAND Corporation* that took up this challenge and developed these new decision-making tools.

Herman Kahn – 11 May 1965.

Photographer: O'Halloran, Thomas. Stored: Library of Congress, Washington D.C., US

RAND is an acronym for Research ANd Development and it was most probably the first think-tank in the world. The institute was set up as *Project Rand*[9] by the U.S. Air Force (U.S.A.F.) in Santa Monica, California in 1946 and was subcontracted to the Douglas Aircraft Company.[10] According to one of the founders, Theodore von Kármán[11] (1881-1963), the new organization was intended to be a "think factory" that would bring and keep together a team of the "*best of the brightest*",[12] who had worked on the *Manhattan Project* (*cf.* first atomic bomb) during the Second World War. Their task was to solve the complex problems that now faced the U.S. as it entered the Cold War. In subsequent years, RAND developed new decision-making methods based on operational research, game theory and new techniques to predict the future, such as scenario planning and the Delphi method (named after the most famous oracle of the ancient world: the Oracle of the Temple of Apollo at Delphi in Greece).

The Delphi method consists of reaching consensus among a group of experts on possible evolutions or solutions for a problem that could or will occur in the future. To achieve this, each expert's arguments are considered as objectively as possible and without prejudice. Furthermore, the participating experts *do not meet and do not know who is presenting which argument*. This is designed to avoid group thinking and group domination, since it was feared – and probably correctly – that some experts with a tremendous reputation, important political influence or personal assertiveness could impose their views on the group during group discussions. In this way, they would perhaps influence the future vision too strongly.

This phenomenon of *group thinking* was actually first discovered by the Imperial German Army during the First World War and afterwards reconfirmed by the experiences of the British Army during the Second World War. They both discovered that it is actually a *very bad idea to bring experienced and highly intelligent people together in a single group at General Staff HQ to plan military operations!* Most of their plans will eventually fail – as both armies discovered to their cost in both world wars. The reason is an absence of sufficient *group diversity* among the staff members. Since too many of the group members have shared the same experiences, and therefore have the same opinions, there is not enough critical thinking and debate[13]. People with the same education, training, experience and vision find it difficult to make plans which accept that the enemy may outsmart them. Critical assumptions become implicit assumptions; the group becomes blind to alternatives. Together, they fail to think the unthinkable. Recent research on strategic