

**WILD CARDS:
SURVEYING EXTREME CHANGE**

Bruno Miguel Oliveira Silva

Dissertation presented in partial fulfillment of the Requirements for the
Degree of Master in Portuguese Economy and International Integration

Supervisor:

Sandro Mendonça,
Assistant Professor, Department of Economics ISCTE Business School

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Abstract

Socio-economic complexity, quickened by technical change, amplified by globalisation, limits the prediction powers of agents' actions and increases the need to deal with uncertainty about the future. For many years foresight has been positioned as having a central relevance in the present context of turmoil and insecurity, especially when disruptions and trend-breaking events are of the essence.

Within the subject-area of foresight, however, the concept of extreme sudden change remains still quite unclear. Wild cards, or “high impact”/“low-probability” events, with the potential to redefine the “rules of the game” are a concept worth revisiting given its novelty in the literature and analytical importance in contemporary volatile environments.

This thesis focuses on the role and evolution of the concept of wild card in foresight literature. Our main objective is to provide an account of the state of the art of wild card research.

To this end, the methodological approach deployed uses both quantitative data (bibliometric analysis of research papers) and qualitative information (constructivist method based on interviews with experts) as a way of achieving robust insight on what wild cards are as a concept and how they are evolving in the real world. This two-pronged approach allowed for the validation of the findings of the systematic survey of the literature through the lens of the international researchers and practitioners that we were able to enquire.

This methodology is unlike any other we have been able to detect in the extant literature, and may confer this effort a degree of novelty. As far as substantive contributions are concerned, this thesis sought to better distil a definition of the concept of wild card within a foresight's framework, study its interrelations with other phenomena of change, and also look into the anticipation and adaptation possibilities when dealing with wild cards.

Keywords: Foresight, Wild Cards, Weak Signals

JEL (Classification system): M and O

Resumo

A intensificação da complexidade socioeconómica, amplificada pela globalização, limita a previsibilidade das acções dos agentes económicos, aumentando a incerteza quanto ao futuro.

Ao longo dos anos destaca-se a contribuição da análise prospectiva para um processo sistemático de antecipação do que o futuro pode reservar. O exame das forças que impõem a evolução da economia, da tecnologia e de outras dimensões da sociedade permitido pela prospectiva, bem como a construção de uma melhor percepção quanto a oportunidades e ameaças na área da política pública e da gestão empresarial, garantem a esta disciplina uma notoriedade num contexto actual marcado por volatilidade, ambiguidade e incerteza.

No seio desta temática mantém-se ainda em desenvolvimento a categoria de mudança extrema e súbita. Os conceitos que visam abordar eventos de baixa probabilidade e alto impacto, de natureza “disruptiva” e com o potencial de redefinir as “regras do jogo”, são ainda recentes e passíveis de aprofundamento. Por exemplo, noções como “wild cards” carecem ainda de definição precisa e perímetro consensual.

O presente estudo debruça-se sobre este objecto de estudo, os eventos-ruptura habitualmente descritos como “wild cards”. A abordagem é de “segunda ordem”, isto é, esta dissertação visa o estudo da teorização do conceito de “wild card”. Para esse fim, foi escolhida uma metodologia integrada combinando elementos quantitativos (através de uma análise bibliométrica) e qualitativos (com levantamento de opinião de especialistas inquiridos a especialistas nacionais e internacionais). Na base deste trabalho de revisão de literatura e de contacto com analistas esta dissertação procura construir uma síntese crítica e criativa do estado da arte e especificar um conjunto de características relevantes para a consideração e adaptação face a “wild cards”.

Palavras Chave: Foresight, Wild Cards, Weak Signals
JEL (Classification system): M e O

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List of abbreviations and terms

- 3D - Three dimensional
- APA - Agência Portuguesa do Ambiente (Portuguese Environmental Agency)
- BP - British Petroleum
- CO2 - Carbon dioxide
- DEFRA - Department for Environment, Food and Rural Affairs
- DNA - Deoxyribonucleic Acid
- DPP - Departamento de Prospectiva e Planeamento e Relações Internacionais
(Department of Foresight, Planning and International Affairs)
- EFMN - European Foresight Monitoring Network
- ESPON - European Spatial Planning Observation Network
- EU - European Union
- GE - General Electric
- ICI - Imperial Chemical Industries
- PESTE - Political, Economic, Social, Technological, Environmental
- R&D - Research and development
- RIG - Reference Impact Grid
- SEWS - Strategic early warning system'
- STEEP - Social-Cultural, Science & Technology, Energy, Ecology and Economy, and
Geo-Politics
- USA - United States of America
- WTO - World Trade Organization
- WWW - World Wide Web

Executive summary

Increasing turbulence and complexity requires greater ex-ante and ex-post adaptability from organizations if they are to survive and be successful. Under these conditions, constantly re-defined by globalization, technical progress and climate change, organizations are left in need of processes and approaches to deal with uncertainty.

This dissertation considers how foresight may be an answer, especially in cases of disruptive events known as “wild cards”. It is assumed that the use of the set of tools associated with foresight:

- a) enables decision-makers to build a broader understanding of critical issues and their dynamic context;
- b) facilitates pertinent information processing and improves organisational learning;
- c) fosters recognition of driving forces that may lead to disruptive developments as well as allowing for a better management of the impact of change when it materialises.

Wild cards are one of the most challenging change phenomena. They have been defined as unanticipated, regime-shifting, paradigm-destroying events causing irreversible transformation in the evolution of a system. The key goal of the present project is to appraise the state of the art of wild card research.

In this thesis this inherently multidimensional concept is analysed through the use of quantitative indicators (bibliometric study) as well as qualitative data (enquiries to leading foresight specialists). Thus, this study uses a mix of primary empirical material (the opinion of experts collected for this study) and secondary sources (a systematic literature review conducted with the help of a scientific paper database) to provide a comprehensive, up-to-date and reflexive understanding of wild cards as an emergent foresight concept. Overall, it can be said that the present work was carried out by following the example of foresight’s own reflexive methods, i.e. gathering intelligence for trend analysis on the evolution of the wild card concept and appraising it on the basis of expert opinion analysis.

Through these analyses were obtained a set of information that allows a broader vision of the evolution of this field:

- The total number of relevant articles is 71, coming out mostly in the 2000s, particularly between 2010 and 2012;
- *Futures* (which published 30% of all the relevant articles), *Long Range Planning* (15%), and *Foresight* (6%) are the main journals in this sub-field;
- As for impact *Futures* (123 citations), *Strategic Management Journal* (119) and *Long Range Planning* (104 citations) are the most prominent journals;
- Regarding authors' nationality, the majority of them are from the US (34%), Finland (13%), Germany (11%) and Britain (9%);
- Concerning the research method, the theoretical articles are predominant (65% of the sample);
- As for the identified main target groups, the following were considered: research community (70% of all papers), business organizations and government agencies and departments.

The experts, when asked, defined foresight and, more specifically, wild cards, as major areas of concern. They define wild cards as unexpected and unprecedented events that redefine future trajectories. Eventual anticipation and/or reaction is considered a very difficult task, but essential to survival in an uncertain environment.

1. Introduction

1.1 First-mover advantages into the radically uncertain future

As the present work was being completed a number of events shook the world, the European continent, and Portugal in particular. In the week previous to the submission of this thesis several issues punctured news desks. Egypt's president Mohamed Morsi was ousted by the armed forces (July 3rd, 2013), echoing the "Arab Spring events" and the recent protests in other large emerging nations like Turkey and Brazil demonstrations, going on since June. A Bolivian official airplane carrying President Evo Morales was denied free access in European airspace (July 1st, 2013), an incident fired by suspicions that whistle-blower Edward Snowden was aboard and to which Latin American governments responded furiously increasing diplomatic tensions already high amid European outrage against the electronic eavesdropping by the US National Security Agency. Early that same week Portugal was rocked by the surprise resignation, in close succession, of two top ministers calling into question the continuity of a coalition government and generating costly volatility in a country struggling to accommodate the austerity packages associated to the €78bi "troika" bailout of 2011. All these events were unforeseen by commentators, but were acknowledged as potentially very significant once they happened.

As this small sample of news items shows, the contemporary environment is inescapably characterized by turbulence and increasing dynamism. Technological innovation and the spread of globalisation are phenomena that, at the turn of the twenty-first century, both expanded the number of potential sources of novelty, as well as amplified the reach of the quickening pace of change phenomena. These developing conditions, which tilt progress toward increasing complexity, call for heightened awareness and higher flexibility in decision-making and strategic definition at the corporate and public-policy levels.

This thesis provides a discussion of how "foresight" can and has been be of use to make sense in such environments. The ability to anticipate and quickly adapt to changes (most of the times only emergent and still barely detectable in the horizon) may yield first-mover advantages in dealing with threats and ensuing opportunities.

This can be decisive in an organization's success. The same is true concerning the importance of steering clear of a possible iceberg ahead.

The present work deals with the subject-area of foresight, sometimes also referred to as “futures studies”. Within this broad field this thesis engages with the specific topic of sudden and infrequent, unprecedented and dramatic events. In a word, this study is concerned with the concept referred to in the literature as “wild cards”. In the context of present day severely volatile markets and of unevenly impactful climate change, such themes have gathered significant attention. For instance, such events have been dubbed “black swans” (Taleb, 2009) and “extreme events” (IPCC, 2012), respectively. Thus, in a world increasingly marked by spiked uncertainty the case for a wild card perspective within the foresight perspective is compelling. Current understanding, however, still trails behind its recent rise in the corporate and governmental agendas. We seek to appraise the state of the art of wild card research.

1.2 Focusing on “wild card”-related research challenges

This research attempts to review how wild card and related concepts have been defined and the analytical role ascribed to in the context of foresight and future studies. The interrelation between the concept of wild cards and the one of “weak signals”, i.e. between strategic discontinuities and “early warnings”, also deserves special treatment due to the potential implications regarding wild card anticipation. Wild cards organisational preparedness, given the need to increase resilience in such cases, is also of relevance for our aims.

Analysing the specialized literature on this subject, however, there is a want of surveys that are concerned specifically with the concept of wild card. This dissertation addresses this gap and, in so doing, provides a moving picture of how wild cards studies are evolving as well as identifying current research’s achievements, contributions and future directions. In particular, with this project the goal is to pursue the answers to the following research questions:

- a) How is the concept of wild card currently perceived? How to define it?
- b) What is the role of wild cards within the large network of foresight concepts?
- c) What achievements? What progress already made and what is ahead?

1.3 Methodological approach

A number of decisions were made regarding the theoretical support of this work and the collection of quantitative and qualitative data for analysis. The theoretical background for the concept of wild card and its research was contextualized within foresight's techniques and tools, alongside other concepts like uncertainty, trends, drivers of change and weak signals. As already mentioned, the relationship between wild cards and weak signals is particularly studied since their interconnection seems especially important in extant research.

In fact, the two concepts are sometimes used as synonyms whereas several authors support that weak signals may provide advance indications regarding wild cards. Definitions and distinctions made on the basis of a systematic survey of the relevant body of published foresight material constitute, therefore, key aims of the present work.

The gathering of the data analysed comprised two different stages. In the first stage a quantitative analysis was conducted. A *corpus* of research articles was identified through a search on a specialised website of the international scientific publisher Elsevier, namely on the SciVerse ScienceDirect platform, part of the Scopus database. The *corpus* was subsequently used for a bibliometric analysis to study the evolution of the research in a manner akin to that carried out in numerous such analyses such as Teixeira (2008, 2011).

In a second stage, a social constructivist approach, similar to the one employed by Sharif (2006) in his studies of the National Systems of Innovation concept, was adopted. The purpose being to gather key insights on wild cards from experts actively involved in its research. The experts' answers were compiled following a set of interviews/enquiries to some of the foremost specialists in the subject of foresight and wild cards.

The combination of these two types of empirical inputs, of quantitative and qualitative nature, allows for a comprehensive and integrative study. This “belts and suspenders” approach is methodologically prudent (a safeguard against possible biases) and, at the same time, allows for more up-to-date information on our research topic. In this way, this thesis is positioned itself within foresight's own reflexive philosophy, i.e., first we

conduct an analysis on the evolution of the wild card concept through “hard data” and then we validate this on the basis of “soft opinion” analysis.

The methodology adopted here is unlike any other study we have been able to identify in wild card research or even in the realm of foresight literature at large. It thus can offer, perhaps, a new perspective on what remains one of the more elusive intellectual and management challenges in the area of futures studies.

1.4 Structure

The thesis is organized as follows. Chapter 2 presents the theoretical framework, categorizing the main issues. It goes through four basic themes: foresight as a body of research; trends and trend-breaking events; weak signals; and wild cards. Chapter 3 describes and explains the empirical foundations of the research, namely the survey of secondary sources and the engagement with primary data. Chapter 4 describes the methodology employed on this study and the objectives behind the choices that were made. Chapter 5 comprises the quantitative and qualitative analyses of the key characteristics of the wild card literature in the past 20 years, and discusses the results of the empirical analysis combining them with the findings of the systematic literature survey. Lastly, Chapter 6 concludes with some considerations on the research results and possible future research ambitions.

2. Foresight as framework

“The future is too important to be ignored, notwithstanding this difficulty [of predicting the future].” (Kahane, 1992:38)

2.1 The impertinence of uncertainty

What is with the corporate economic system that calls for decision-makers to venture beyond the realm of predictability and even plausibility? Lynch (1995) described modern business environment as *“chaotic, fragmented and unpredictable and complex and turbulent”* (Lynch, 1995:46 in Mason, 2011:11). Regarding the two last notions, Mason (2011:10-11) defines complexity as a *“measure of heterogeneity or diversity in environmental sub-factors such as customers, suppliers, socio-politics and technology”* and turbulence as *“dynamism in the environment, involving rapid, unexpected change in the environmental sub-dimensions”*. As Prakken (2004:57) states, when complexity and dynamics are simultaneously present the result is uncertainty.

A turbulent and unstable environment undermines traditional, linear, rationalist planning approaches (Florice and Miller, 2001:445). Under unpredictability it is *“impossible to know with the necessary precision what to commit to today in order to be successful tomorrow”* (Raynor, 2007:4). Given globalization, the rapid evolution of technology, the expansion of human knowledge and the amounting environmental pressures, the uncertainty faced by organizations *“is likely not only to continue but to intensify”* (Schwarz, 2009:291).¹ The specific nature of uncertainty is punctuated by *“unanticipated events, crises, and unthinkable or even evil acts [that] require preparedness for unplanned change”* (Knowles and Saxberg, 1988:252).

The question, then, is how to make future-oriented decisions when precise forecasting is impossible (Solgaard and Schultz, 1988:155; Saul, 2006:93; Makridakis and Taleb, 2009:840). In other words, how can *“organizations in increasingly unpredictable environments (...) manage for today while preparing for the future”* (Liebl and Schwarz, 2010:313)? The answer has been that foresight can be an important asset in this pursuit (Laszlo, 1985:20).

¹ Schwarz had emphasized this same idea before, stressing that *“In the past and even more so in the future, organizations have been and will be subjected to an environment characterized by rapid change and dynamics, and increasing discontinuities”* (Schwarz, 2005:22).

2.2 The emergence of the foresight research program

Foresight has a long and rich history. By 1931 foresight was already identified by Alfred North Whitehead, at Harvard Business School, as critically important to business (Tsoukas, 2004 in Schwarz, 2009:292). The concept, in its modern meaning, originated in the early post-World War II era at the Department of Defence of the United States of America. The context was in fact the difficulties involved in deciding which projects ought to be funded in an uncertain political-military global environment. These techniques implied using experts' opinions in a way that sparked the development of the Delphi technique and the explicit use of scenario techniques, all developed in the Rand Corporation during the early years of the Cold War, under the impulse of Herman Kahn (1922-1983) (Bradfield *et al.*, 2005:798; Rossel, 2012:229).

Rand Corporation, set up as non-profit corporation, was born of a joint collaboration between the USA Airforce and Douglas Aircraft in October 1945, first used scenarios for defining strategies relating to nuclear options during the 1950s (Aligica and Weinstein, 2009:267). Herman Kahn left the Rand Cooperation in 1961 to establish the Hudson Institute and so transported scenarios to social prospective and public policy while keeping a multi-disciplinary and long-range outlook (Bradfield *et al.*, 2005:798). Herman Kahn, who joined Rand Corporation early on, is still now referred as the father of the concept (Bradfield *et al.*, 2005:797; Varum and Melo, 2010:356).

In the business arena, scenario planning as an explicit strategy tool was introduced in the early 1970s through the Royal Dutch/Shell experiences (Van Notten *et al.*, 2003:427; Bradfield *et al.*, 2005:799; Varum and Melo, 2010:356). Shell became the ground test for the foresight mind-set and scenario planning.

Under the drive of Pierre Wack in the 1970s and popularized by Peter Schwartz in the 1980s and Kees van der Heijden this was the origin of an Anglo-Dutch school, also referred to as the school of “intuitive logics” or the “Shell approach” (Bradfield *et al.*, 2005:800).

In Europe, foresight studies were also starting in the 1950s (Rossel, 2012:231). Gaston Berger, a French philosopher and futurist, started the *Centre d'Etudes Prospectives* in the mid-1950s where the school of *La Prospective* emerged (OECD 1970:147).

La Prospective, which also included a scenario planning approach, aimed at the development of scenarios to frame political debate and action. The approach was geared toward the integration of fragmentary projections of many sectors into coherent but contrasting socio-economic wholes that would surpass the tendency toward partial and linear view of the future. Troubled with France’s socio-political future, Gaston Berger emphasised that the future was not a “‘*predetermined temporal continuity*’ but *something which is to be created and which can be ‘consciously modelled to be humanly beneficial*’” (Bradfield *et al.*, 2005:802).

In the 1970s, Gaston Berger’s French School was re-energised by the methodological contributions on scenario building of Michel Godet, at the time head of the Department of Future Studies at SEMA, a firm linked with the French defence sector (Bradfield *et al.*, 2005:802). Godet (1986) emphasised the notion of many possible, changeable and constructible futures (*les futuribles*), rather than just a predetermined one, stating that:

“The future is not written, it remains to be carried out. The prospective process admits that, at any given moment, the future is multiple and that from the confrontation between the various actors [we] will derive one future rather than another” (Godet 1986:136 quoted in Martin, 2010:1441).

In spite of many similarities (Martin, 2010:1441), one of the foremost differences between the Anglo/Dutch-American School and *La Prospective* is each one’s focus. While the French school focused more on a public socio-political analysis at the country level, the Anglo/Dutch-American School leaned to a more worldview-level nature (Bradfield *et al.*, 2005:803; Voro, 2006:49). Michel Godet, one of its key proponents, considers two main functions for *La Prospective*: 1) the identification of the organization's capacity and strategy; 2) helping the organization to make strategic choices. Thus, for Godet, first it is necessary to identify the key variables that best characterise the system and then perform an analysis of actors and their linkages and relationships. On this basis scenarios are built taking into account those variables and actors (Correia and Carvalho, 1997:61-62).

As for Peter Schwartz, he sees foresight and scenarios in long-term strategic planning as a way to analyse the set of “possible-logical” driving forces, to foster organizational learning and to better allow decision-making and strategy identification (Correia and Carvalho, 1997:26).

In fact, Constanzo (2004) describes foresight as a mechanism for “*probing and learning*”, through which organizations can envision several futures and take steps towards a desirable one, thus becoming not only a method for anticipating change, but also for inducing change within the organization (Constanzo, 2004).

In the 1980s and the 1990s there was a considerable slowdown in planning activities, specially by key corporations like General Electric (GE) , British Petroleum (BP) and Imperial Chemical Industries (ICI), mainly because “*there was minimal payoff associated with employing planning staff and specialists to formally guide the firm’s future*” (Veliyath, 1992:86). However, in the 2000s a renewed interest in the concept of foresight was rekindled, with an increase of publications in this area (Martelli, 2001; Steinmüller, 2004; Bradfield *et al.*, 2005; Varum and Melo, 2010).

2.3 Modern foresight for economic and business strategy

Foresight is thus a result of the “hot-house” atmosphere at the height of the Cold War. On both sides of the Atlantic particular organisations (not-governmental, not-for-profit) developed a set of theoretical assumptions (the future is a plural canvas yet to be stabilised), methodological pre-requisites (combining hard-data and expert opinions) and pragmatic orientation (mapping possibilities into strategic priorities).

Plugged into these historical roots contemporary futures studies researchers define foresight along lines such as these:

“a process that attempts to broaden the boundaries of perception in four ways: By assessing the implications of present actions, decisions, etc. (consequent assessment); By detecting and avoiding problems before they occur (early warning and guidance); By considering the present implications of possible future events (pro-active strategy formulation); By envisioning aspects of desired futures (normative scenarios)” (Slaughter, 1995 in Uotila *et al.*, 2005:852).

Thus, foresight can be classified as a “*search*” behaviour (Fidler, 2011:542), and consequently a key input in the strategic planning of organizations. This strategic philosophy can accommodate different kinds of specific methodologies and tools, such as:

“1) forecasting, envisaged in the strict sense of calculating possible trajectories based upon past series of data; (2) Delphi exercises, making good use of multi-expert knowledge to put next steps of a given problem into perspective; (3) simulations, based upon some form of systems thinking; and (4) scenario developments, often combining several of these methods” (Rossel, 2009:310).

In fact, recently, the renewal of the investigation in this subject showed an increased attention on the classification and organization of the existent literature, emphasizing the strengths and weaknesses of each methodology through the construction of systematic overviews (Varum and Melo, 2010:356).

Several surveys were published throughout this decade, Chermack *et al.* (2001), Martelli (2001), Bradfield *et al.* (2005), Börjeson *et al.* (2006), Bishop *et al.* (2007) and Varum and Melo (2010); and also several typology exercises namely of Van Notten *et al.* (2003), Voros (2006), Börjeson *et al.* (2006); among several others that could be cited.

Since precise forecasting is typically impossible to obtain in the economic and business world (Makridakis *et al.*, 2009:794), the fact is that in modern strategic management the ability to react quickly to changes, thus turning them into opportunities rather than threats, is essential to success (Camillus and Datta, 1991:73). That is the gap foresight is designed to fill since “*(i)nstead of attempting to predict what is going to happen (...)*”, allows the organization to “*(...) see the forces as they are taking shape and not be blindsided when they lead to major changes*” (Randall, 2009:27).

For all this reasons, “*The role of a foresight process in an organization is not so much to predict the future, but to prepare for it*” (Tsoukas and Shepherd, 2004 cited in Schwarz, 2009:292). Disregarding the need for foresight might result in “*looking too hard in one direction, by neglecting both context and periphery while ignoring the discarding of information that is taking place*” (Neugarten, 2006: 894).

Foresight facilitates pertinent information processing and analysis, allowing the organization to prepare for the impact of these changes, which can be decisive in its

future². Foresight is then “*a process by which one comes to a fuller understanding of the forces shaping the long-term future which should be taken into account in policy formulation, planning and decision-making*” (Coates, 1985 in Martin, 2010:1440).

One of the most important purposes of anticipatory scanning is then to reduce the environmental uncertainty (Klein and Linneman, 1981:69; Veliyath, 1992:87). Because “*most companies tend to be myopic and miss important developments in adjacent and influential industries and societal areas*” (Lindkvist, 2011:3), the exercise of foresight allows for a less biased awareness of the future³.

Systematically analysing the forces more likely to influence that future and examining “*what chances for developments and what options for action are open at present, and then follow up analytically to determine to what alternative future outcomes the developments would lead*” (Solem 1986:4 and Martin and Irvine, 1989:5 in Martin, 2010:1441).

Since organizations incorporate into their routines experience from past situations to solve new problems, if these problems are relatively similar to those faced in the past that experience can be slightly adapted to overcome those obstacles. The problem is that “*history never repeats itself in exactly the same way*” (Makridakis and Taleb, 2009:841). Foresight allows organizations to “*Overcome the usual errors in decision-making: overconfidence and tunnel vision*” (Schoemaker in Varum and Melo, 2010:356).

2.4 Wild Cards as a complement to standard foresight technique

Scenarios are a classic and popular methodological platform for carrying out futures-oriented research. One of foresight’s best known and more widespread techniques, the construction of scenarios, not only allow the comprehension but also the design of several possible futures (Klein and Linneman, 1981:69; Martelli, 2001 in Varum and Melo, 2010:356; Schwarz, 2009:291). Scenarios are long used as an instrument for

² Martinet (2010) underlines the interest of the set of tools associated with foresight, as a way to “*enable the organization to identify, as soon as possible, weak signals, threats and opportunities which can occur and to monitor the constant transformation of capabilities, cultures, structures and management processes in a coherent way*” (Martinet, 2010:1486).

³ Georghiou and Harper (2011) also argue the importance of strategic foresight to counter organizations’ myopia, considering that in an unstable environment, full of unknowables and in constant mutation, foresight can allow an organization to avoid short-term action and reactive thinking, and enable a more integrated thinking (Georghiou and Harper, 2011:248).

surveying future paths, dating back to Plato's "Republic", Thomas More "Utopia" or military strategic planning (Bradfield *et al.*, 2005: 797), their purpose being "(...) *to sensitize us to recognize signals of possible changes in the world (...) and to enable us to respond quickly and appropriately. They are less reassuring than conventional forecasts, but more challenging-and therefore more useful*" (Kahane, 1992:46).

Scenario planning is a standard instrument to address the multiplicity of possible plausible futures and their inherent unpredictability (Lempert, Popper and Bankes, 2003:29).

Rather than engaging in the traditional search for optimal strategies - based on fixed assumptions about the future that may prove incorrect - scenario planning allow the definition of robust strategies, that perform "*reasonably well compared to the alternatives across a wide range of plausible futures*" (Lempert, Popper and Bankes, 2003:52). Regarding the analysis of scenario planning, Varum and Melo (2010:362) have identified two main streams within the thematic literature.

A first group of studies that examines the importance of scenarios as a strategic management tool, defended by authors like Skudlark and Ahn (2002), Miller and Waller (2003), Raynor and Leroux (2004), Masch (2004) and Cornelius *et al.* (2005), among others, which underline the capabilities of scenarios as facilitators of decision-making in a constantly changing environment. These studies define scenario planning as an opportunity to envision plausible future states, in order to help identifying possible strategies to take advantage of opportunities and avoid potential threats.

Another group of studies, such as de Geus (1988), Winch (1999), Martelli (2001), Winch and Arthur (2002), Wright (2005) and Roubelat (2006), is more concerned with the exercise of constructing scenarios, considering "*scenarios as an instrument for institutional and organizational learning*" (Varum and Melo, 2010:362).

Even though scenario planning is one of the most used tools in foresight, some authors state that scenario planning sometimes fails in the identification of unforeseen events, missing, disregarding or misreading the weak signals available (Liebl, 2004; MacKay and McKiernan, 2004; Neugarten, 2006; Postma and Liebl, 2005 in Schwarz, 2009:293). Driven by the past and not the future, "*scenario planning processes are often little more than projections crafted onto past experiences*" (Orišek and Friedrich, 2003 in Schwarz, 2009:293). A key contention is that they must be integrated with other tools like weak signal scanning and wild cards analysis (Mendonça *et al.*, 2004).

As Horton (1999) argues a successful foresight process must have three consecutive stages: the gathering of the available information and knowledge; the interpretation of this knowledge; and the assimilation and assessment of that understanding (Horton, 1999 in Uotila *et al.*, 2005:853). The consideration for novel and disruptive factors, known as wild cards, may be inserted in these three stages. In fact, it should be noted that “*today's policy choices have to be evaluated not only in the light of current policy goals but also in the light of possible, sometimes dramatic, future events.*” (Smith and Dubois, 2010:846).

2.5 Preliminary conclusions

Foresight assumes increasing importance as a way to navigate a constantly shifting world; its set of tools and processes address the need of dealing with the unknown, fostering organizations’ rapid and flexible response to change.

Foresight also promotes increased peripheral view allowing organizations to better perceive business conditions and overcoming tunnel vision and blind spots. This is of value, especially, in what concerns change of extreme kinds.

Integrating a wild card analysis scheme with standard foresight technique enables a wider and more comprehensive perception of what the future might bring. The next Chapter will focus on the set of issues in and around the concept of wild cards. It will trace its theoretical evolution trying to clarify its boundaries regarding other phenomena of change.

3. Wild card and other kind of change phenomena

“The world is not what we used to think it is, a kind of giant mechanism obeying eternal laws in a predictable and deterministic fashion.”

(Laszlo, 1985:4)

3.1 Trends, drivers of change and discontinuities

In foresight analyses there are several critical forces that enable a better understanding of what the future might bring. In that regard it is important to understand the relevance of some key concepts like *trends*, *drivers of change* and *discontinuities*. This Chapter undertakes a literature review of the established foresight research on wild cards.

It is possible to define *trend* as a wide phenomenon identified by several actors; generalized and transversal; experienced by everyone in similar contexts; with the potential to “*create broad parameters for shifts in attitudes, policies and business focus over periods of several years that usually have global reach (...) they are larger than the power of individual organizations and often nation states as well.*” (Saritas and Smith, 2011:294). Trends are characterized as “*(...) ongoing, fundamental societal change over an extended period (...) [or] a short term phenomenon, e.g. in fashion or music*” (Schwarz, 2005:23). Eventually, they can even become “*heavy trends*” or “*megatrends*”, the latter as defined by John Naisbitt (1982), referring to tendencies growing and shifting gradually, only influenced in a certain degree since “*A megatrend contains several and even contradictory sub-events and series of events.*” (Naisbitt, 1982 in Holopainen and Toivonen, 2011:4).

As for *drivers of change*, they are critical uncertainties with great potential impact on organizations or their institutional environment. They arise as the result of conscious or unconscious choices in different fields (investment, policy, strategic options), thus being susceptible to changes in these factors. Although similar to trends, drivers do not have an impact as transversal, but are usually more aimed on certain economic activities or areas (Holopainen and Toivonen, 2011:4).

In short, drivers of change are “*factors, forces or events – developments which may be amenable to changes according to one’s strategic choices, investments, R&D activities or foresight knowledge and strategies. They are both presently accessible and future relevant.*” (Saritas and Smith, 2011:295).

Regarding *discontinuities*, these are significant changes in the pre-existent trajectories; one of the most usual examples cited is the one of technological discontinuities. Discontinuities pose a threat to the more inflexible organizations more related to old technologies, but also opportunities for more aware organizations. Following the concepts of *gradual discontinuity* and *abrupt discontinuity*, as defined by van Notten *et al.* (2005), it is possible to define the first concept as “transition”, i.e. as a “*change of paradigm and the introduction of new practices and rules*” involving periods of “*slow and fast development*”, and the second related to the “*instantaneous nature of change [as] the distinguishing feature of abrupt discontinuities, [giving] society a jolt, even if it is of a temporary and reversible nature*” (van Notten *et al.*, 2005:180-181,190). Therefore, abrupt discontinuity is a concept much closer to the one of wild cards.

Gradual change such as trends or slow transitions is slower and can be expected in advance, giving organizations additional time to react (Hiltunen, 2006:67). By contrast, wild cards are the opposite of gradual change, they are inherently uncontrollable change. An important issue is thus how to anticipate them.

3.2 Weak signals

Accurate advanced information is essential to resilient and path-creating organizations and countries (Mendonça *et al.*, 2012:218). Foresight methodologies enable an integrated thinking that helps organizations develop contingent strategies in unstable environments, essential in strategic definitions (Barber, 2006:82). An important concept, still in its early phases but already vastly present in the literature is the concept of *weak signals*, also referred to as *emerging issues* (Hiltunen, 2006:64) and *early warnings* (Petersen, 1999). If trends, drivers of change and discontinuities can be thought of as the “winds of change”, then weak signals are the first whispers. Listening carefully enough may even allow one to weather the storm.

In the early 1960s, the concept of weak signals can be immediately detected in the French school of *La Prospective* where, in 1964, Pierre Massé mentioned the concept of “*faits porteurs d’avenir*”, that is, developments today that are pregnant with what tomorrow will bring (Rossel, 2012:231). Godet (1993) further strengthened this vision defining weak signal as a germ, “*a factor of change hardly perceptible at present, but which will constitute a strong trend in the future*” (Godet, 1993 in Kuosa, 2010:43)⁴.

Weak signals were debated further in the works of Aguilar (1967) and particularly developed by Igor Ansoff, in the 1970s and at the beginning of the 1980s (Rossel, 2012:230). Ansoff was one of the first to deepen the definition of weak signals as a complement to the notion of strategic planning. Ansoff borrowed his weak signal metaphor from the information theory, defining the concept as early symptoms, imperfect warnings, that could be internal or external, and partial and incomplete (Ansoff, 1984:369; Rossel, 2009:308; Mendonça *et al.*, 2012). He believed that all events would have to go through a series of stages from “weak signals” to “strong signals” (Ansoff, 1984:21; Nikander and Eloranta, 1997:371; Mendonça *et al.*, 2004:206).

He stressed “*that the firm had to cope with changes, some of them not necessarily expected and that one could characterize this changing environment as turbulent*” (Rossel, 2012:230). He also argued that whereas strategic planning is rather useful in gradual changing environments where “strong signals” are available, it has several limitations when facing surprises/unexpected events. Consequently, he defended that a weak signal approach is necessary to expand the flexibility and improve the reaction time of organizations (Ansoff, 1984:384; see also Rossel, 2009:307; Holopainen and Toivonen, 2011:1-2; Rossel, 2012:230).

Weak signals are usually described as a tacit (subjective and hard to quantify) or explicit (more clear) form of knowledge (Kaivo-oja, 2012:207). According to Web (1987) some signs may not be detected, or be hardly noted, because the attention is centred elsewhere. Also, there are filters between the original signal and its receptors that may diminish its strength (Webb, 1987:12-14 in Hiltunen, 2006:71).

⁴ Kamppinen, Kuusi, and Söderland (2002) and Rossel (2009) define weak signal similarly, as an event, or events, that may not seem to be vital in the present but that may have a significant importance in the future (Kamppinen *et al.*, 2002 in Holopainen and Toivonen, 2011:3; Rossel, 2009:308). This view is also shared by Saritas and Smith (2011) and Heinonen and Hiltunen (2012) whom consider weak signals as the earliest information concerning future changes, possible yet still unconfirmed; the first signs or symptoms of paradigm shifts, big changes, future trends, drivers, discontinuities, growing trends, or even megatrends (Saritas and Smith, 2011:297; Heinonen and Hiltunen, 2012:255).

Saul (2006) considered weak signals as “*ambiguous and controversial bits of information about the competitive environment that are typically hidden among the “noise” of the prevailing sensemaking paradigm and that gradually coalesce to form a pattern of intelligence that alerts sensitive leaders that it may be time to change their game*” (Saul, 2006:93).

Thus, a weak signal is information yet to be structured, with unclear consequences (Ilmolaa and Kuusi, 2006:911). A concept close to the ones of emerging issues, seeds of change and early warning signals, sometimes even used as synonyms (Hiltunen, 2008b:247; Glassey, 2009:321).

To Coffman (1997c), weak signals are dispersed data, diffused over time through several sources and channels of communication, which can indicate an arriving wild card. They are ideas or information pre-announcing developments that can disturb and affect organizations, difficult to identify amongst “*general noise*”, startling and unforeseen to the receptor; though others may have seen it coming sometimes, they are scorned even by experts. They usually are not yet mature, with a delay before becoming mainstream. If caught early, these signs can constitute an actual opportunity instead of a threat, a chance to innovate, learn and grow (Coffman, 1997c; Mendonça *et al.*, 2004:206; Decker *et al.*, 2004:190; Holopainen and Toivonen, 2011:3).

Therefore, to “*achieve and sustain competitive advantage, companies in turbulent environments need to scan the business environment to capture weak signals of early opportunities. If they are captured, activities on the periphery can be a source of new strategic insight*” (Ilmolaa and Kuusi, 2006:909)⁵.

Weak signals can be of all kinds of sources: of human nature (internal or external); of textual nature (published and internal documents sources); and of online nature (internet sources) (Hiltunen, 2008a:24). For instance, nowadays the World Wide Web and Social Media are seen as new and border sources for weak signal detection (Decker *et al.*, 2004:190; Pang, 2010; Pang, 2012:35; Glassey, 2012:257).

⁵ Several authors emphasize the importance of peripheral vision as a way to enable organizations to expand horizons (Ansoff, 1984:334; Day and Schoemaker, 2005; Holopainen and Toivonen, 2011:5; Kaivo-oja, 2012). Systematically scanning for weak signals on the periphery of their field of vision, outside of their usual boundaries, allow organizations to counter “tunnel-vision” and the constant stumble on the unexpected (Neugarten, 2006: 901).

A key advantage of weak signals is their potential value for announcing discontinuities, in advance, namely wild cards, that is, those “*sudden and urgent changes in the firm’s perspective which threaten either a major profit reversal or the loss of a major opportunity*” (Ansoff, 1984 in Holopainen and Toivonen, 2011:2). Weak signals are seen as hints and glimpses of information, available before a major shift in the existing paradigm to an unfamiliar path (Mendonça *et al.*, 2004:205).

3.3 Weak signals as advanced indicators of wild cards

It is accepted that shocks, strategic surprises and discontinuities do not necessarily arise devoid of warning signs. Consequently, early detection could lead to “*quickly spot those signals that are relevant and explore them further, filter out the noise, and pursue opportunities ahead of the competition or recognize the early signs of trouble before they escalate into major problems*” (Schwarz, 2009:292). On the contrary, organizations blind to weak signals tend to drive “*through red light[s] [that is] (...) not noticing, ignoring, suppressing or scorning warning signals which, if properly addressed, would have contributed to preventing an incorrect decision*” (Wissema, 2002:522).

Weak signal is a concept close with the one of wild card, sometimes even used as synonyms by some authors (Hiltunen, 2008b:247; Rossel, 2009:308; Glassey, 2009:321). For instance, Mannermaa (1999) first considered both weak signals and wild cards as a single concept, as unprecedented surprises with the potential to become “*central phenomena or influential factors*” in the future; later, Mannermaa (2004) defined weak signals very similarly to wild cards, as low probability and high impact phenomena (Mannermaa, 1999, 2004 in Hiltunen, 2006:63). However, weak signals are now normally assumed as a way to anticipate the advent of a wild card (Petersen, 1999; Cornish, 2003; Mendonça *et al.*, 2004; Hiltunen, 2006:62, 71; Holopainen and Toivonen, 2011:3; Rossel, 2012:236).

It is also underlined that “*weak signals are connected [to] a variety of options from moderately uncertain to very uncertain events and issues, while wild card analysis focuses on very uncertain events and on potential events that are likely to have rather significant impacts*” (Kaivo-oja, 2012:209).

The distinction between the two terms can be seen in the work of Ansoff, in which he stresses how weak signals provide early information in the identification of strategic discontinuities and strategic surprises, advocating the utilization of early weak signal analysis as a preparation for a fast response to change (Holopainen and Toivonen, 2011:3-4).

Consequently, some authors suggest that a wild card analysis methodology “*can be decomposed into two main activities: wild card imagining and weak signal scanning*” (Mendonça *et al.*, 2009:28). By scrutinizing the decision environment, weak signal scanning can be useful in the anticipation of wild cards (analytically useful) thus improving the capacity to deal with changing environments (managerially useful) (Mendonça *et al.*, 2004:201).

As a prelude of trend breaking crises, warning signs may arise. The possibility is there for those the most aware to read them (Mitroff, 1988). Early scanning and weak signals detection can allow ways to anticipate major discontinuities and facilitate preparation and adaptation (Mendonça *et al.*, 2009:24). So, the central benefit of weak signal analysis is that organisations will take less time to react, saving time when the (un)anticipated event occurs (Haeckel, 2004:182,185; Hiltunen, 2006:62; Holopainen and Toivonen, 2011:2). In fact, “*even if an organization cannot act to prevent a crisis once in motion (such as an impending natural disaster or even economic recession), recognition of warning signals (...) allow for planning to minimize the consequences*” (Veil, 2011:120).

Schwarz (2005) discusses the concept of a “*strategic early warning system*” (SEWS) as a technique that enables organizations to prepare for early responses to crises, emphasizing at the same time that the lack of SEWS has been listed as one of the key causes of failure in strategic planning within the German corporations (Schwarz, 2005:22). However, weak signals themselves are useless if not acted upon after their identification, which is why “*the impact of a weak-signal cannot be quantified on a deterministic scale, because this usually depends on the actions that follow the signal*” (Decker *et al.*, 2004:192).

But it must be bared in mind that while “*postulating a particular wild card makes it rather natural to envisage possible weak signals. On the contrary, considering anything as a weak signal, without a scenario, context, perspective or criss-crossing factor*

substantiating some sense-making claim, is only a temporarily valid exercise that does not necessarily induce associated wild cards” (Rossel, 2012:236).

So, through the methodology suggested by Mendonça *et al.* (2009) an organization would be able to scout beyond its usual borders using information mining and filtering, exploring the periphery and thus being able to identify technologies, processes, competitors or trends that may drive future strategic uncertainties. At the same time, continuously stimulating the organization to consider alternative views and challenge static or preconceived ideas, allowing for lateral thinking.

As Ansoff defined it, weak signal analysis improves the organization consciousness and knowledge, its malleability to new situations, and its direct reaction to the opportunity/threat (Holopainen and Toivonen, 2011:2).

Therefore, the combination of weak signal sensing with an active wild card practice scheme significantly increases the organization’s flexibility, fostering its awareness. Thus, allowing for an “*organizational state of mind more equipped to face unfamiliar prospects and consider innovative responses in the wake of wild cards*” (Mendonça *et al.*, 2009:28).

3.4 Wild cards as “unthinkable” change phenomena

Herman Kahn (1962), the pioneer of foresight, stressed that it is in fact necessary to “*think about the unthinkable*”. Unanticipated events are bound to happen in a continuously changing world, full of surprises, discontinuities and shocks. Thus, we are forced to embrace the improbable, to consider the implausible, and to allow for what was deemed impossible. The concept of wild cards brings in to a sharp focus this important paradox, one that contemporary organizations cannot afford to overlook (Knowles and Saxberg, 1988:254).

Looking into the meaning imbued in the concepts’ designation, the Oxford dictionary defines wild card as:

“1 - playing card that can have any value, suit, colour, or other property in a game at the discretion of the player holding it;

2 - an opportunity to enter a sports competition without having to take part in qualifying matches or be ranked at a particular level;

3 - person or thing whose influence is unpredictable or whose qualities are uncertain.” (Oxford dictionary, 2013).

The original poker term for wild card meant a card in a deck of playing cards that can be given any value by its owner. Consequently, implying a high level of control for the holder of such knowledge and a risk to the other players that don't know what value will be given to the card, or when it will be drawn from the deck. As such, the term evokes the “unknown” and the notion of “surprise”, on a subjective point of view, since the impact of a wild card can be devastating for some and extremely positive for others. A wild card completely changes the game, for better or worse...

Wild cards are regime-shifting, paradigm-destroying events, altering existing trends or generating new ones, causing irreversible transformation in the evolution of the organization/system (Mendonça *et al.*, 2009:25, 26)⁶. As an analogy for wild cards it is at times referred the notion of mutation. Due to exogenous or endogenous factors, sometimes organisms' DNA can be subjected to permanent change.

That change, a mutation, can have a tremendous impact on the organism's life or no impact at all, its consequences ranging from extremely negative to extremely positive. Therefore, using this comparison, wild cards are the most extreme mutations.

Hence, due to the potential impacts of a wild card, serious attention must be given to anticipatory methods that can allow an organization not only to prepare for the aftershock, but also help to define a more robust business and management strategy.

Ideally, this strategy could minimize the negative impacts and maximize business opportunities within the new, post-event, landscape (Knowles and Saxberg, 1988:254; Saritas and Smith, 2011:295-296; Markley, 2011:15).

Wild card analysis is a conceptual tool to support the contemplation of alternatives beyond the present state of the art, the existing framework and the contemporary thinking (Barber, 2006:78). Wild cards are often used to test the stability of scenarios regarding unforeseen events and the effect of several imagined, high impact, events. A basic step may be the introduction of a wild card within a scenario to flesh out what options and choices were and can be available. Therefore, this concept amplifies the foresight scope and the resulting organizational learning (Mendonça *et al.*, 2009:31; 34). So, while scenarios are aimed at the imagination and understanding of possible futures, based on past actions and choices, the wild cards test the reaction of the system as a measure of its resilience (Smith and Dubois, 2010:847).

⁶ Wild cards are generally defined as shocking events with massive magnitude (Hiltunen, 2006:64), with sudden, serious and unforeseen consequences (Mendonça *et al.*, 2004:202-203).

Hence, a wild card is a foresight tool used in a more profound futures analysis, since “They are not “seen in normal play” they produce a result despite a lack of sufficient information (...) and have a large degree of unpredictability” (Barber, 2006:76).

3.5 Wild cards by any other names

It is a challenge to define what a wild card is. The concept is sometimes used broadly as a synonym of surprises, discontinuities, disruptive events, structural breaks, bifurcations, systemic breaks, shocks, abrupt and discontinuous bursts, *faits porteurs d’avenir*, dislocations, trend breaches, paradigm busters, etc. (Mendonça *et al.*, 2004:203; Van Notten *et al.*, 2005:178; Hiltunen 2006:62)

Parallels can also be drawn with the notion of *crisis*, defined as “a period of sudden change during which a totally new system is formed”, with the meaning of crisis not only covering “risk, uncertainty, threat, conflict, accident, and instability but also opportunity” (Sofuoglu and Basoglu, 2008:811). Booth’s (1993) definition of crisis adds to this view, since he considers it “a situation faced by an individual, a group or an organization, which they are unable to cope with, by the use of normal routine procedures and, in which stress is created by sudden change” (Booth, 1993:86).

Alternative nomenclatures for the concept of extreme change have been forwarded by some authors, namely Nassim Taleb’s “black swans” (2007) and Oliver Markley’s “STEEP surprises” (2011), a term which Markley defends as a more accurate designation for the concept than wild card.

The term of “black swans” derives from the belief, prevalent before 1697 (when the Dutch explorer Willem de Vlamingh explored the Swan River in Western Australia), that all swans were white. When black swans were identified in Australia, the concept of “black swans” was considered a metaphor for something that was untold and hard to believe in (Des Dearlove, 2009:59; Runde, 2010:493), a case later used by thinkers such as Karl Popper, the philosopher of science.

Nassim Taleb (2007) imported and popularized this expression in his book, *The Black Swan: The Impact of the Highly Improbable*. This contribution, published ahead of the international financial crisis known as the “Great Recession” or the “Little Depression”, addresses radical uncertainty and the epistemic challenges posed by problems with “outlier status” (Des Dearlove, 2009:59; Runde, 2010:493).

He defines “*black swans*” as:

“(...) *an event that lies outside the realm of regular expectations, because nothing in the past can convincingly point to its possibility. Second, it carries an extreme impact. Third in spite of its outlier status, human nature makes us concoct explanations for its occurrence after the fact, making it explainable and predictable. These perturbations are not only large, they have lasting effects*” (Taleb, 2007:xvii–xviii).

According to Taleb, a “*black swan*” is an event with three core properties: 1) it is an unexpected event (“*outside our tunnel of possibilities*” – *outlier*); 2) with major repercussions (“*an extreme impact*”); 3) and explainable after its occurrence (only cognitively manageable ex-post) (Bogle, 2008:30; Runde, 2010:493).

3.6 Wild cards, from concept to policy

Among the specialized literature on foresight theory and methodology, there are several definitions of the concept of wild cards. They are usually defined as high-impact, low-probability events, with the potential to cause major disruption, nearly impossible to predict due to their rare or even unprecedented nature (Rockfellow, 1994:14; Petersen, 1997; Cornish 2003:19; Mendonça *et al.* 2004:203; Barber, 2006:77; Voros, 2006:47; Saffo, 2007:1; Mendonça *et al.*, 2009:24; Smith and Dubois, 2010:847).

The notion is intertwined with Ansoff’s strategic surprises theory, where these strategic surprises are defined as a major opportunity or loss to the enterprises: “*sudden, urgent, unfamiliar changes in the firm’s perspective that bring the threat of either a major profit reversal or loss of major opportunity*” (Mendonça *et al.*, 2009:24).

John Petersen (1999), one of the first to further define the concept, categorized wild cards broadly as big surprises, with a shock effect, significant and direct results, ample and substantial implications; hampering the existent system possibility to quickly adjust to the shock (Petersen in Barber, 2006:77).

Wild cards are trend-breaking/creating events, so this concept can be thought as meaning an incident or episode that, arriving by total surprise, has an extensive impact in the system dynamics – becoming a turning point in the registered development (Barber, 2006:77; Mendonça *et al.*, 2004:201; Mendonça *et al.*, 2009:23).

Mendonça *et al.* (2009) give a comprehensive definition of wild cards:

“singular (idiosyncratic, historically original), sudden (abrupt, fast), surprising (unexpected, startling) and shattering (serious, severe) events(...) [that is] i) one-of-a-kind discrete incidents ii) that arise rapidly iii) in a way not fully recognizable ex ante from past information iv) leading to profound perturbations and alterations in the known state of affairs, (...) impacting (...) a pre-existing trend or altering its rate of growth, (...) possibly setting new directions for future evolution” (Mendonça *et al.*, 2009:25).

They are an integrating part of nowadays complex, turbulent and fast-evolving environments, and should not be ignored in decision-making and strategic preparation.

As Brooks (1986) highlighted *“(...) leaving out the external shocks, nonlinear responses and discontinuous behaviour so typical of social and natural systems”* can implicate being *“unprepared to interpret a host of not-impossible eventualities.”* (Brooks, 1986 in Van Notten *et al.*, 2005:176).

Although it is not possible to know exactly when a wild card will happen or what its effects will be, it is nonetheless sound to make provisions, since these events have a potentially dramatic impact, capable of unleashing uncontrollable change (Mendonça, *et al.*, 2004:204; Hiltunen, 2006:69; Mendonça, *et al.*, 2009:23) upon a given environment/system.

The main result being the discussion and consequent identification of viable options and possible strategic decisions should these wild cards occur (May, 1996:162; Dewar, 2003; Steinmüller, 2004:9; Van Notten *et al.*, 2005:190; Smith and Dubois, 2010:847). In a fast changing world, action must be taken in time, *“doing too little too late (...) can significantly damage the organization”* (Mendonça *et al.*, 2004:202).

The pertinence in thinking about unpredicted and sudden events lays in finding ways to access, compile, comprehend and assimilate information, so the organization can dodge potentially negative outcomes (Barber, 2006:77, 78).

Wild card analysis help create more adaptive organizations and thus more flexible and robust. Even if wild cards are impossible to evade, wild card thinking and weak signal identification, may enrich the organization’s knowledge and understanding of uncertainties, enabling construction of better suited plans and strategies to generate action (Mendonça *et al.*, 2009:35). For Barber (2006), wild card analysis is meant to *“stretch”, “expand”* and *“crack”* the thinking process, facilitating the discussion of different viewpoints and multiplying the options and possible futures considered, thus breaking the existing paradigms and preconceptions (Barber, 2006).

3.7 Categories, typologies, and varieties of wild cards

Steinmüller (2004) stated that there are various ways to identify, study and systematize wild cards, namely by: *topic* (subject or sector in which the wild card originates or where it will have direct impact); *impact* (variation amongst the effect of wild cards); *plausibility* (several are highly improbable, some not so much); *time scale* (short-term, medium-term or longer-term developments); and *causes* (if it is an accident due to chance or the result of longer-term processes) (Steinmüller, 2004:6).

According to Mendonça *et al.* (2009) wild cards can be originated by nature (e.g. natural disasters) or by man (e.g. terrorism), and their source can either be external (unpredicted outside events that “crash” with our system) or internal (events evolving from an endogenously set of factors) (Mendonça *et al.*, 2009:26).

As for probability of occurrence, wild cards are countless times described as low probability events (Rockfellow, 1994; Petersen, 1999) although some authors do not agree entirely with that definition. Hiltunen (2006) defends that “*(t)he characteristic low probability does not fit to the definition of wild cards*” defining the concept as “*rapid (and in that sense, surprising) events that have vast consequences can be used in futures studies*” (Hiltunen, 2006:66). Even if a specific imagined wild card can have a low probability of occurrence, the chance that a wild card of any type will happen is necessarily higher (Smith and Dubois, 2010:847). This leads us to the notion of varieties of wild cards.

Oliver Markley (2011:2) expanded this discussion, proposing the existence of wild cards with high probability and high impact, but low credibility, suggesting a typology based on their credibility:

- Type I. Low probability, high impact, high credibility;
- Type II. High probability, high-impact, low credibility;
- Type III. High probability, high-impact, credibility discussion;
- Type IV. High probability, high-impact, high credibility.

As for the duration of the impacts, Hiltunen (2006) divides wild cards in irreversible ones (when it takes more than ten years for the system to return to its original state) and reversible (when changes can be overturned after some months or years) (Hiltunen,

2006:6). There seems to be some divergences among authors regarding the duration of a wild card event, however, the majority of authors define wild cards as rapid shocks and surprises with an abrupt and unexpected end, but quick manifestation (Petersen, 1999; Mendonça *et al.*, 2004; Hiltunen, 2006:63).

Petersen (1997) identified six categories of potential wild cards. He divided the nature of wild cards into the following types: 1) earth and sky; 2) biomedical developments; 3) geopolitical and sociological changes; 4) technology and infrastructure upheaval; 5) surprise attack; 6) spiritual and paranormal (Barber, 2006:82).

Barber (2006) in a more client related methodology, defined a “Reference Impact Grid” (RIG) where wild cards could be analysed regarding their scope of impact and their frame of reference, from personal to global scope (Barber, 2006:83-84). The impact of a wild card will, in particular, depend on the capacity of response of the organization itself, its anticipation, awareness and flexibility to shocks (Smith and Dubois, 2010:847).

3.8 Preliminary conclusions

Wild card research can be a messy place. It is as if this topic has been addressed in such a wild variety of different ways that the literature itself had to tame it. By conducting a traditional survey of the literature this Chapter attempted to give some order to what is a scattered, and still not cumulative, set of contributions.

Amongst the several critical forces that enable a better understanding of what lies ahead, wild cards are acknowledged to embody future extreme sudden change. Wild cards emerge in foresight as unexpected, unprecedented, events that redefine future trajectories; they are improbable, but never impossible; their impact is massive, wide-ranging, and inescapable.

Wild card thinking involves the development of contingent strategies through the consideration of multiple strategic choices. It is an organisational learning tool that improves the ability to anticipate, react and adapt to fast moving frameworks. This exercise increases periphery vision, broadens futures perception and prevents one-dimensional, optimistic, expectations of business evolution.

Weak signals are widely assumed as the way for anticipating wild cards if successfully identified amidst the general noise, through a process of information gathering and

sense-making that enables a new mental framework more suited to deal with unexpected surprises, challenging prevalent assumptions.

However, improbable events are seldom prioritized over every day's concerns, so organizations tend to act reactively rather than proactively. They do so at their own peril. In nowadays cutthroat environment even the slightest flinch can have disastrous repercussions, either by market loss or by squandering the opportunity of a lifetime.

The next Chapter tries to set forth a specific way assess the size and reach of the literature that promotes this cluster of ideas. We will do this suggesting a systematic way to survey the literature and a way to calibrate how such a survey can be read.

4. Methodology

4.1 Data Sources

The richness of the concept of wild cards brings about many different approaches in the literature regarding the characterization and evaluation of this concept. Hence, it is difficult to define a single methodology, a “correct” approach to the analysis of an inherently multidimensional concept. To this challenge this thesis adopts an integrative approach.

This thesis employs “first order” inputs (original empirical evidence), framed by reference to “second order” material (previously existing literature). This approach is based on the argument that empirical evidence and conceptual theory must interact to achieve higher degrees of understanding (Freeman and Soete, 1997:viii, 219). The new empirical data collected is a prime contribution of this project and seeks to contribute to a new understanding of the object of study. The empirical analysis is based on the use of quantitative indicators, from a bibliometric analysis on the concept of wild cards, and qualitative data, obtained by several enquiries to relevant foresight specialists, including some Portuguese experts.

In this way, the chosen methodology is a combination of quantitative and qualitative elements. As such, this work follows the methodological options of other surveys, in which the use of quantitative surveys accompanying more qualitative surveys enables an unbiased assessment of key concepts, allowing the study of recent paths and trajectories in a given research field (Teixeira, 2011). This angle of analysis seems appropriate to deal with the aims of this thesis: to ascertain the nature and nurture of wild card analysis. Here, then, we propose a systematic survey of the literature and an inquiry into the research players as a way to gain insight into the concept itself.

4.2 Quantitative evidence

Despite the recognition of the value of the wild card research, there is a lack of explicit surveys on this area. Most accounts of wild cards offer broad analyses on foresight

techniques and tools, without providing an overall image of the positioning of the wild card literature within the broad field of futures studies.

Our first goal is to conduct a quantitative exploration of the state-of-the-art of wild card research, based on bibliometric methods, to examine the origins, evolution and influence of the research on the concept.

The literature search followed a methodology adapted from the works of Varum and Melo (2010) and Srinuan and Bohlin (2011). As selection criterion, the search was restricted to articles published in scientific journals, rather than books, since this is easier to do given the available databases and because this is usually the preferred means for academics and practitioners to publish their newest research.

Therefore, in order to identify the relevant publications regarding wild cards, the literature search was conducted on the website of the international scientific publisher Elsevier, namely on the SciVerse ScienceDirect platform, part of the Scopus database. This is one of the major abstract and citation database of peer-reviewed literature, covering around 16500 peer-reviewed Scientific, Technical, Medical and Social Sciences journals. In order to ensure the procedure used on the search can be replicated, this Chapter details all the steps that were followed.

A number of descriptors were used on the search, specifically chosen as different aspects of the phenomenon under analysis. To study the evolution of the research on wild cards the term was considered, as well as close word variations around it, such as “wildcard” or “wild-cards”. Then the following cluster of key-words was considered: “turbulent environment”; “damaging event”; “unpredictable change”; “sudden event”; etc. (see Table 1).

The query targeted the use of these expressions on the title, the abstract or the key words of all articles published on all the journals in the fields of “Arts and Humanities”, “Business, Management and Accounting”, “Decision Sciences”, “Economics, Econometrics and Finance” and “Social Sciences”. All other fields were excluded from the start, since they were unlikely to yield relevant articles on this matter. Regarding the chronological period covered, it was the widest permitted by the database - “all years”.

Table 1 – Key words for article search

| Key-words | Number of articles |
|---------------------------|--------------------|
| turbulent environment | 177 |
| damaging event | 8 |
| wild card | 38 |
| wild-card | 38 |
| wildcard | 14 |
| unpredictable change | 30 |
| sudden event | 10 |
| discontinuity | 1590 |
| weak signal | 92 |
| disruptive event | 30 |
| structural break | 948 |
| bifurcation | 871 |
| unprecedented development | 9 |
| systemic break | 0 |
| unprecedented shock | 0 |
| shock | 11223 |
| warning signal | 114 |
| radically uncertain | 5 |
| critical disturbance | 1 |
| shattering event | 2 |
| strategic surprise | 13 |
| paradigm-destroy | 0 |
| paradigm destroy | 0 |
| major crash | 6 |
| strategic unknown | 1 |
| dislocation | 892 |
| extreme event | 215 |
| strategic dynamite | 0 |
| black swan | 30 |
| steep surprise | 0 |
| foresight | 1026 |

Source: This thesis

After the first search some expressions produced a too large number of results, many of which regarding subjects unrelated with the objectives of this work. Therefore, only the searches with less than 200 results were considered due to time restraints and practicability. Afterwards, all the abstracts were examined in order to ascertain the relevance of these articles to this research. Later, a second search was undertaken where all the expressions indicated above were used in association with the expression “wild card”. That is, the query then targeted articles where the title, the abstract or the key words featured both “wild card” and each one of those expressions. Finally, a third search associated “foresight” with each of the other expressions.

The use of these two filters sought to ensure a close connection between the articles selected, the thematic field (foresight) and the object of study (wild cards). The abstracts of the articles identified as a result of the second and third searches were then reviewed as mentioned before.

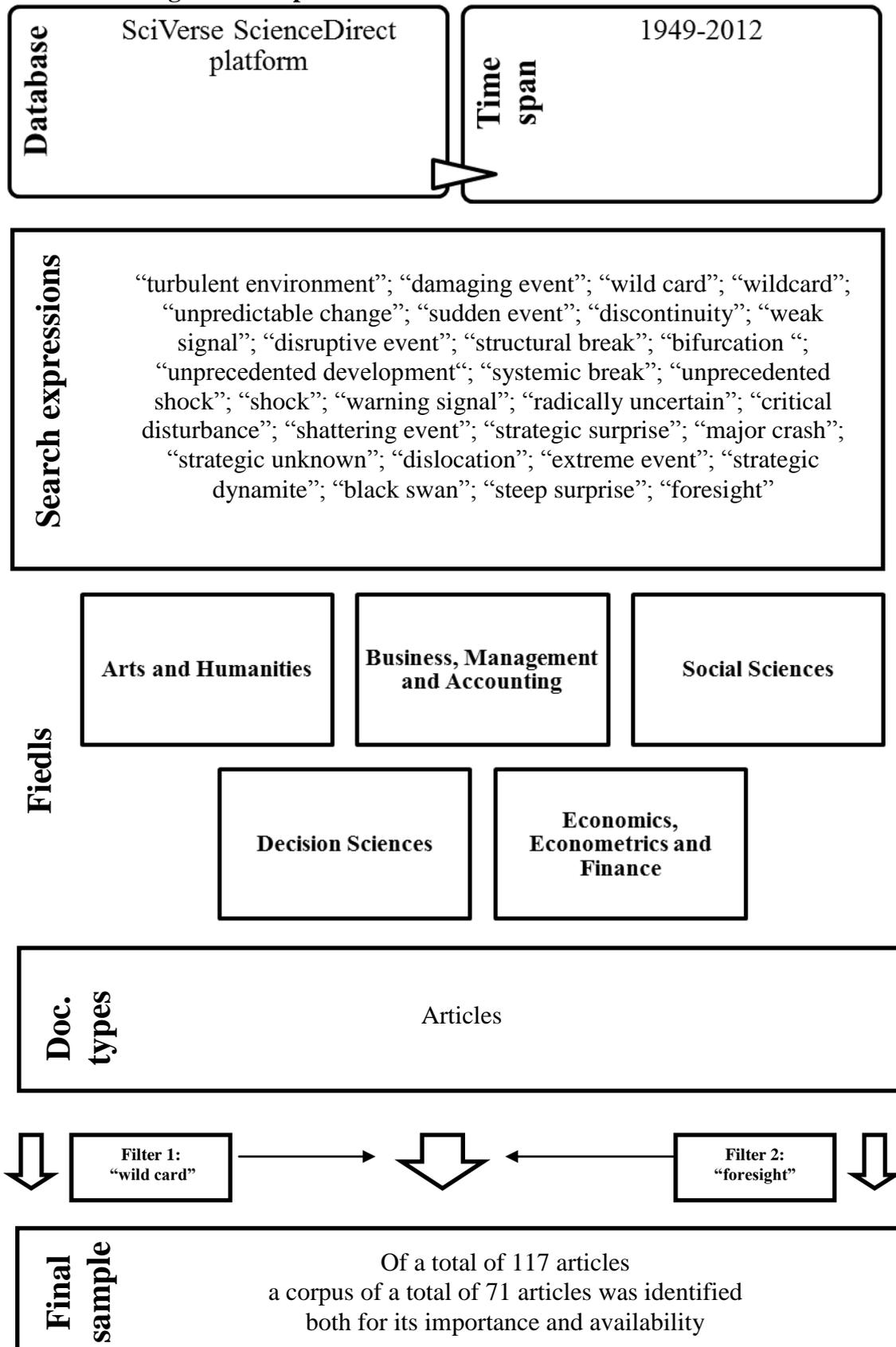
After these procedures were concluded, a total of 117 articles were identified. Of these, 71, both for its importance and availability, were chosen to integrate the *corpus*. The oldest article identified was published in 1981 and the newest in 2012. All are listed in the Appendix. The period of reference for this data gathering from Elsevier /SciVerse ScienceDirect/Scopus databases is until 1 March 2013. In this way, the search is meant to saturate the field both chronologically and thematically; the *corpus*, thus, serves as a comprehensive base for its understanding.

Each of the articles included in the *corpus* were reviewed and classified in accordance with the objectives of the study, in a two-stage analysis. Firstly, we conducted an analysis based on the following indicators: number of articles published per year; number of articles published per decade; percentage and yearly average number of articles published; articles published per journal; authors with more than two articles published; author nationality (considered as the country of affiliation); top five most cited articles; number of citations per journal; number of citations per author; articles published per research method; average of citations per year per research method; articles published per research method and journal; articles published per target group; and articles published per target group and research method.

The articles were then appreciated following the methodology used by Varum and Melo (2010) and also by the European Foresight Monitoring Network (EFMN, 2009a) being classified according to the research methodology used and their intended target group or audience. Regarding the research method, the articles were identified as theoretical (articles dedicated to the explanation or definition of theoretical concepts), methodological (where new research methods or models are proposed or discussed), or empirical (papers focusing case studies or analysis of primary data) (Varum and Melo, 2010:357). About the audience, the articles were classified according to the target group addressed: research community, business organizations or governmental agencies.

All information concerning the articles included in the *corpus* was compiled on a specific table available on the Appendix. Here the decisions undertaken in conducting the literature classification are made available and transparent so that they can be independently verified. This is important for the replication of the present study by other researchers and future students on this research topic who may want to criticise and build on the present work.

Figure 1 - Steps followed for the selection of the literature



Source: This thesis

4.3 Qualitative evidence

In the qualitative analysis a sociological and historical perspective was chosen to understand the concept of wild card, adapting the methodology used by Sharif (2006) when analysing the concept of national systems of innovation. Within the framework of foresight studies a “social constructivist” approach was adopted to trace some key features of the wild card concept that are best addressed by those who participate in its creation, development, and dissemination. This analysis enabled a qualitative study of the wild card concept and its manifestation as a real-world phenomenon. This angle both complements and tests the sensitivity of the conclusions arrived at through the bibliometric analysis. The compilation of views by leading experts is, thus, an extra way by which the present study sought to add value to what is known about this challenging topic.

A set of interviews/enquiries to some of the foremost specialists in the subject of foresight and wild cards were undertaken. Between April and May 2013 a set of enquiries were sent to several (33) specialists identified in the quantitative analysis or in the literature review as the core group of international scholars associated with foresight, weak signals and wild cards. We were able to achieve a response rate well above 25%.

The enquiry was guided by our (tradition and systematic) literature reviews. The questions were designed to ensure that all issues of particular interest were covered by the following questions (see Appendix):

1. *When thinking about the future do you believe it is important to consider disruptive events, i.e. wild cards? Why?*
2. *Where and how would you define and identify this type of change?*
3. *Which techniques do you believe more suited to anticipate, and react to, wild cards?*
4. *When thinking about future wild cards do you expect more or less will happen in the next 5 years comparing with the last? Why?*

After this first enquiry, a follow up question was made, focusing on specific aspects of the wild card concept namely synonyms and examples (see Appendix).

A similar set of questions was also sent to the Portuguese core group of scholars associated with this theme, in which 2 particular questions were added about foresight in Portugal (Appendix). Though only two Portuguese specialists, of the four contacted, answered, their responses proved to be very helpful.

All the interviews were arranged by email or phone, and then transcribed in the Appendix including some biographic information about the specialists that answered.

4.4 Preliminary conclusions

This thesis aims at contributing to the understanding of wild cards. We seek to do this by finding out more about what is meant by “wild cards” in the field of foresight research. In order to provide an original and robust appraisal of the concept at hand we propose a methodological set-up that combines fresh empirical material of different sources.

Our study integrates quantitative indicators (a bibliometric analysis on a corpus of research articles identified through a search on the SciVerse ScienceDirect platform, part of the Scopus database) and qualitative data (a social constructivist approach based on enquiries to leading experts to gather key insights on wild cards from world experts actively involved in its research). This provides a comprehensive and novel approach to study a multidimensional and evolving concept such as wild cards.

In the next Chapter the empirical data analysis is undertaken. We start by the bibliometric analysis and complete it with the examination of the experts' answers.

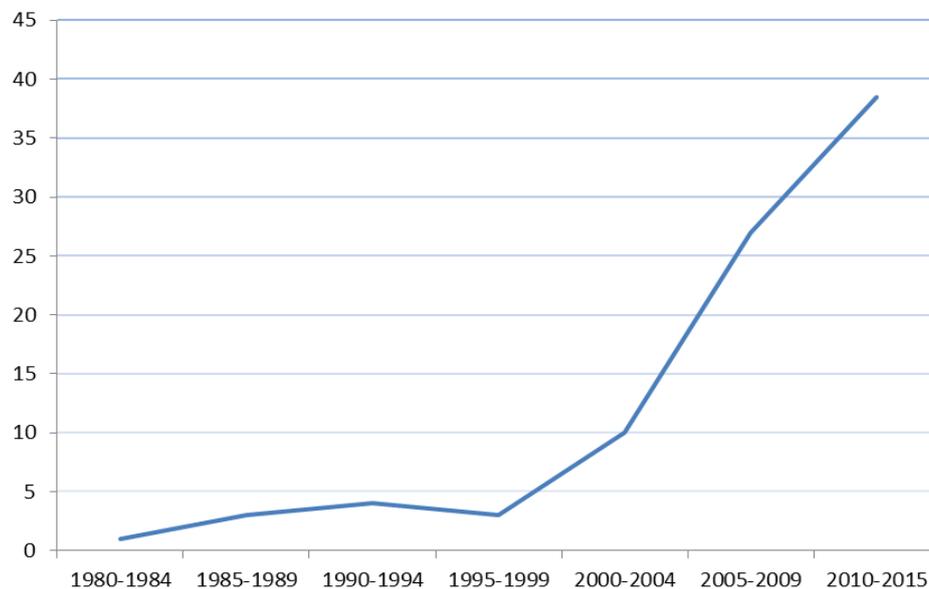
5. Researching wild card research

5.1 Quantitative analysis

5.1.1 Published Articles

The earliest article we find, through the procedures presented in Chapter 4, was published in the beginning of the 1980s. A paper by Klein and Linneman (1981) referred to the use of scenarios in corporate planning. Since then, the number of articles published year on year increased markedly (Figure 2). Let us note that the latest period, 2010-2012, only comprises 3 years instead of the 5 years included in all the previous periods. In order to avoid an unnecessary skewing of the information transmitted in Figure 2, an estimate was done extrapolating from the average yearly evolution on that period, multiplying the average number of publications per year by a factor of 5.

Figure 2 – Number of wild card relevant articles published per year 1980-2015

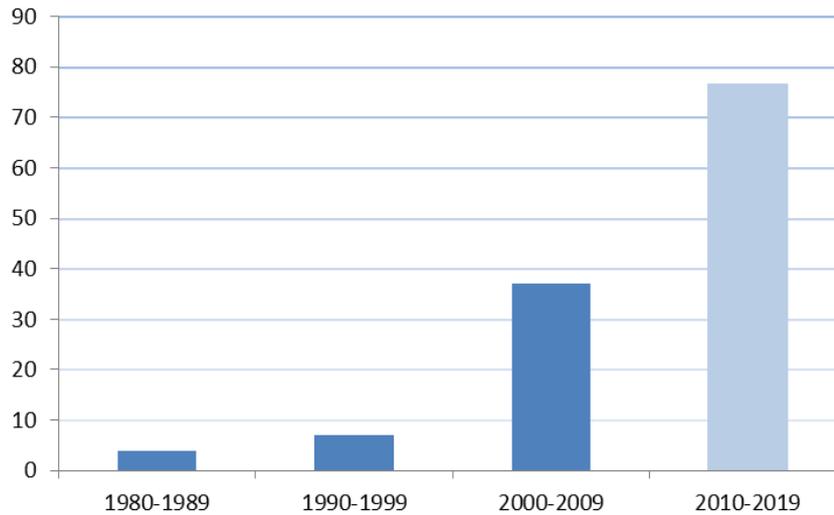


Source: This thesis

Note: Time intervals of 5 years

After a slow evolution during the 1980s and 1990s, the number of published articles grew considerably in the first decade of the 2000s, and kept a robust rhythm between 2010 and 2019 (Figure 3). Again, as indicated above, to avoid skewing the information, the number of articles included on the last period, 2010-2019, is an estimate resulting from multiplying the average number of publications per year by a factor of 10.

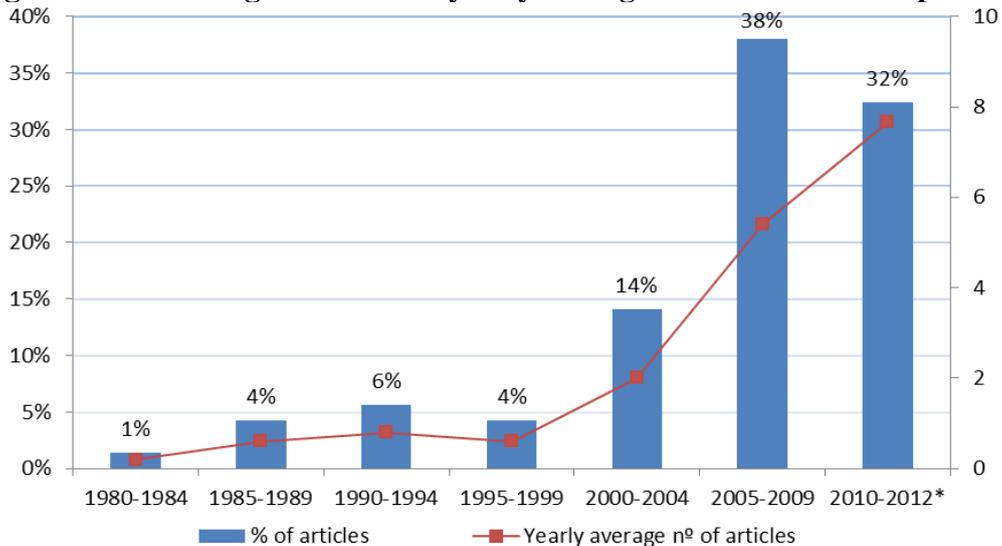
Figure 3 – Number of articles published per decade



Source: This thesis

In fact, between the years of 2010-2012 the higher number of publications per year was registered, around 8 (7.7) each year, up from 5.4 during 2000-2009. No less than 32% of the articles were published in this period of 3 years (Figure 4).

Figure 4 – Percentage of total and yearly average number of articles published



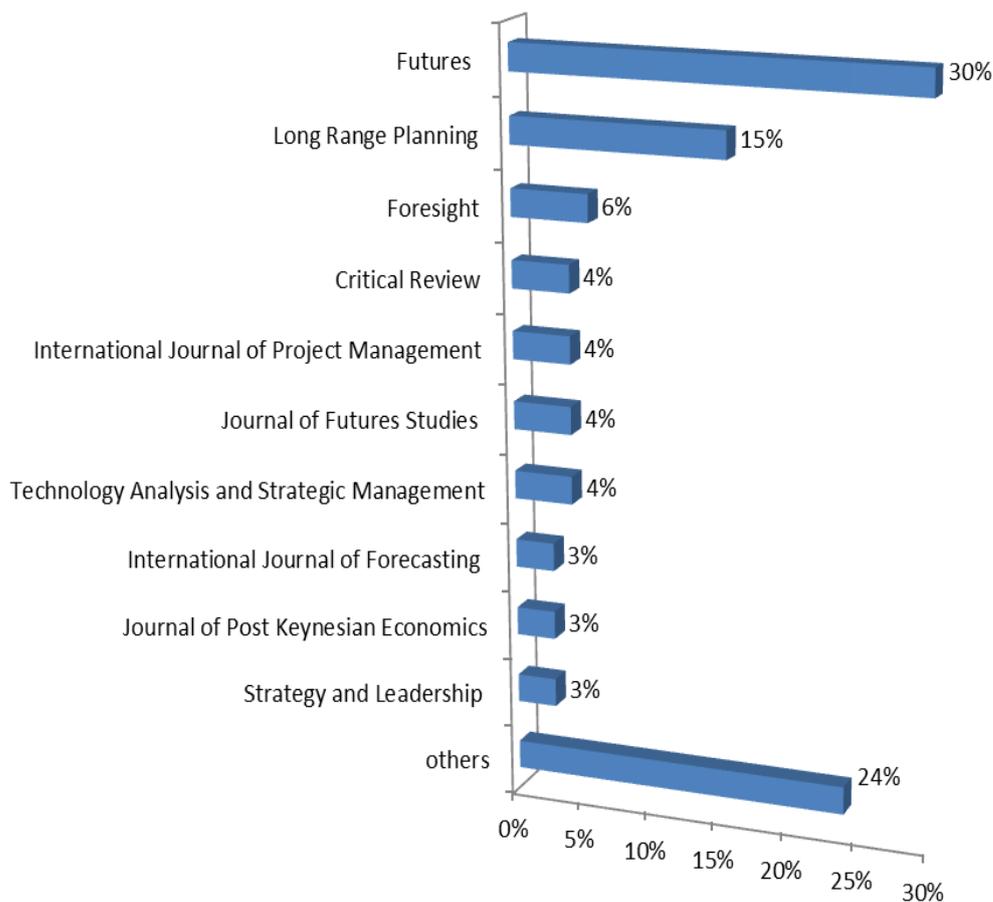
Source: This thesis

Note: Time interval 5 years, except (*) 3 years.

5.1.2 Journals

The identified articles were published in 26 different outlets across several scientific areas. Nevertheless, three major journals - *Futures* with 30%, *Long Range Planning* with 15% and *Foresight* with 6% - can be singled out as the main venues for this area in this time frame, totaling more than 51% of the articles identified (Figure 5).

Figure 5 – Articles published per journal (%)



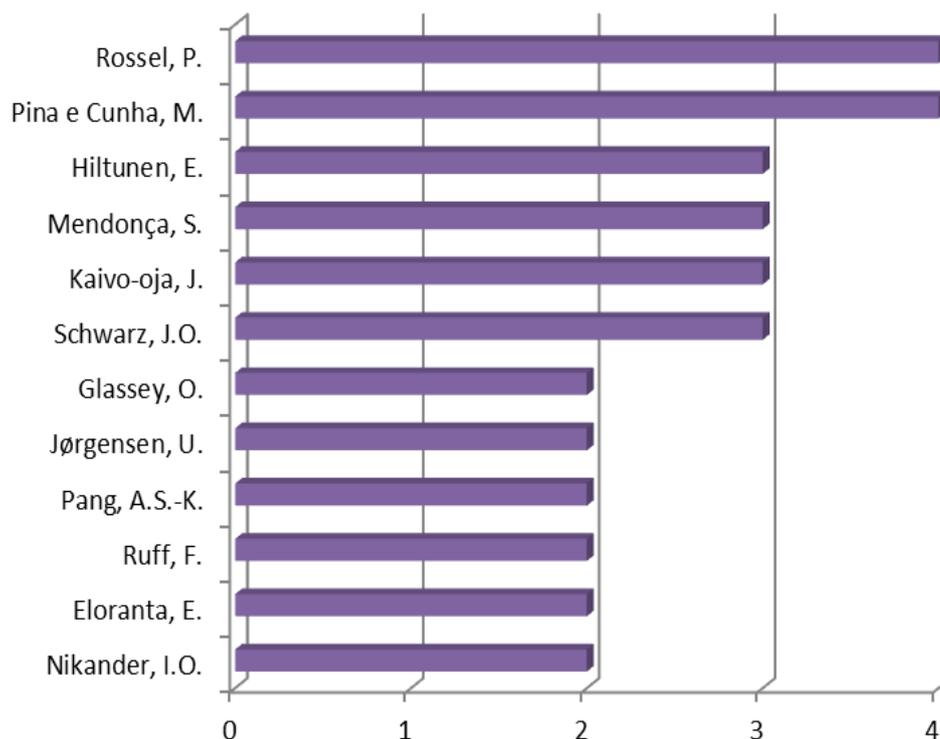
Source: This thesis

These top 3 journals are core publications for the area of foresight and future studies, to which the *Journal of Futures Studies*, *Technology Analysis and Strategic Management* and *Strategy and Leadership* can also be added as the set of venues where new research on foresight is many times made available. Therefore, we find relevant articles on the concept of wild cards can be found on the expected journals, i.e. specialized journals.

5.1.3 Authorship

On the 71 articles comprising the sample under study 98 authors were identified, corresponding to an average of 1.4 authors per article. Pierre Rossel and Miguel Pina e Cunha are the two authors with the highest number of published articles - four articles each - followed by Jan Oliver Schwarz, Sandro Mendonça, Jari Kaivo-oja and Elina Hiltunen (three articles each) and six other authors who have published at least two articles on the subject (Figure 6). We should bear in mind that a great number of these authors (9 out of the 12 most productive authors) are, in fact, co-authors or have published in common special issues, which conveys an idea of an emerging epistemic community in this area.

Figure 6 – Authors with more than two articles published

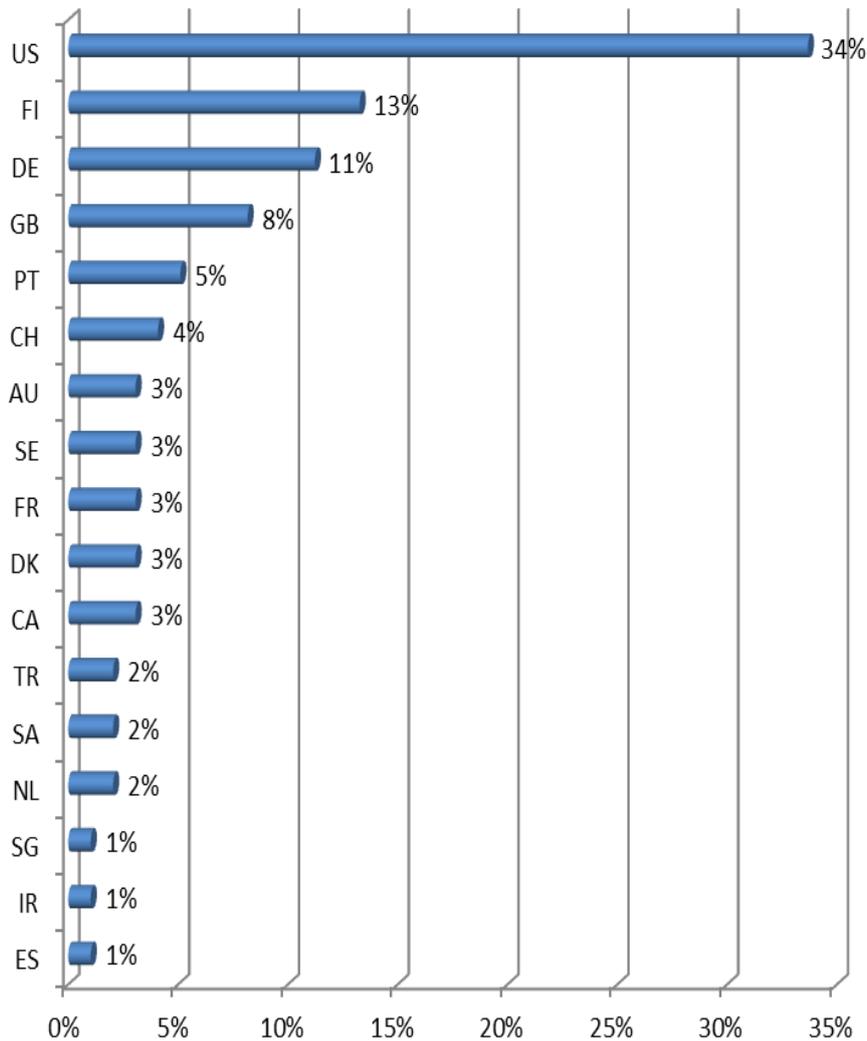


Source: This thesis

Assuming the author's nationalities as their country of affiliation, the majority of the grand total (71 papers) are from the US (34%) and on a lesser scale from Finland (13%), Germany (11%) and Britain (9%) (Figure 7).

Curiously, authors from the US generally wrote only one article on this subject, showing that the predominance is more related to the size of the author pool, rather than a systematic research on this field in the American academia. By contrast, most of the authors that wrote at least two articles are European. In fact, when considering the European Union (EU) as a nationality, 50% of the authors were based from the EU at the time of publishing. This may indicate the existence of a more mature and cumulative research program on foresight on this side of the Atlantic.

Figure 7 – Author Nationality %



| | | | | |
|------------------|---------------------|--------------------|-------------------|-------------------------------|
| Label | CZ - Czech Republic | FI - Finland | NL - Netherlands | SG - Singapore |
| AU - Australia | DE - Germany | FR - France | PT - Portugal | TR - Turkey |
| CA - Canada | DK - Denmark | GB - Great Britain | SA - South Africa | US - United States of America |
| CH - Switzerland | ES - Spain | IR - Iran | SE - Sweden | |

Source: This thesis

5.1.4 Accounting for the impact of articles and journals

In order to ascertain the relative influence of authors and journals concerned with the study of foresight and wild cards a citation analysis was employed.

Looking at the five most-cited articles of the sample, it is possible to identify that Robert M. Grant's "Strategic planning in a turbulent environment: Evidence from the oil majors", published in the *Strategic Management Journal*, in 2003, is the most cited article with 119 citations (Table 2).

Table 2 – Top 5 most cited articles

| Rank | Title | Author | Country of affiliation | Date | Source | Cited |
|------|---|--|------------------------|------|--|-------|
| 1 | Strategic planning in a turbulent environment: Evidence from the oil majors | Grant, R.M. | US | 2003 | <i>Strategic Management Journal</i> 24 (6), pp. 491-517 | 119 |
| 2 | Wild cards, weak signals and organisational improvisation | Mendonça, S., Pina Cunha, M., Kaivo-oja, J., Ruff, F. | PT PT FI DE | 2004 | <i>Futures</i> 36 (2), pp. 201-218 | 44 |
| 3 | Strategizing for anticipated risks and turbulence in large-scale engineering projects | Florichel, S., Miller, R. | CA CA | 2001 | <i>International Journal of Project Management</i> 19 (8), pp. 445-455 | 32 |
| 4 | Scanning the periphery | Day, G.S., Schoemaker, P.J.H. | US US | 2005 | <i>Harvard Business Review</i> 83 (11), pp. 135-148+168 | 29 |
| 5 | Designing lateral organizations: An analysis of the benefits, costs, and enablers of nonhierarchical organizational forms | Joyce, W.F., McGee, V.E., Slocum Jr., J.W. | US US US | 1997 | <i>Decision Sciences</i> 28 (1), pp. 1-25 | 23 |

Source: This thesis

The second most-cited article was "Wild cards, weak signals and organisational improvisation", authored by Miguel Pina e Cunha, Sandro Mendonça, Jari Kaivo-oja and Frank Ruff, published in 2004 in the journal *Futures*, with a total of 44 citations.

The third most-cited being the article “Strategizing for anticipated risks and turbulence in large-scale engineering projects” by Serghei Floricel and Roger Miller, published in 2001 in the *International Journal of Project Management*, with 32 citations.

The first result, Robert M. Grant’s article, however, must be considered an outlier. This article is not published on a core foresight journal and is only marginally related to subject of foresight. As Table 2 clearly illustrates, even though the critical mass of the research on this matter is in Europe (as seen in Chapter 5.1.4), articles hailing from the US tend to get higher citations “hits”.

A considerable high number of articles, 24, were not cited, even though some were published in the top journals like *Futures*, *Long Range Planning* and *Foresight*.

As for the most-cited journals in the sample, *Futures* (123 citations), *Strategic Management Journal* (119) and *Long Range Planning* (104 citations) are prominent, amounting to 63% of the total citations. Focusing on the group of journals more related to future studies, *Futures*, *Long Range Planning*, *Journal of Future Studies*, *Foresight and Technology Analysis and Strategic Management*, the grand total of citations amounts to 286, corresponding to 52% of the citations received by articles of the *corpus* (Figure 8).

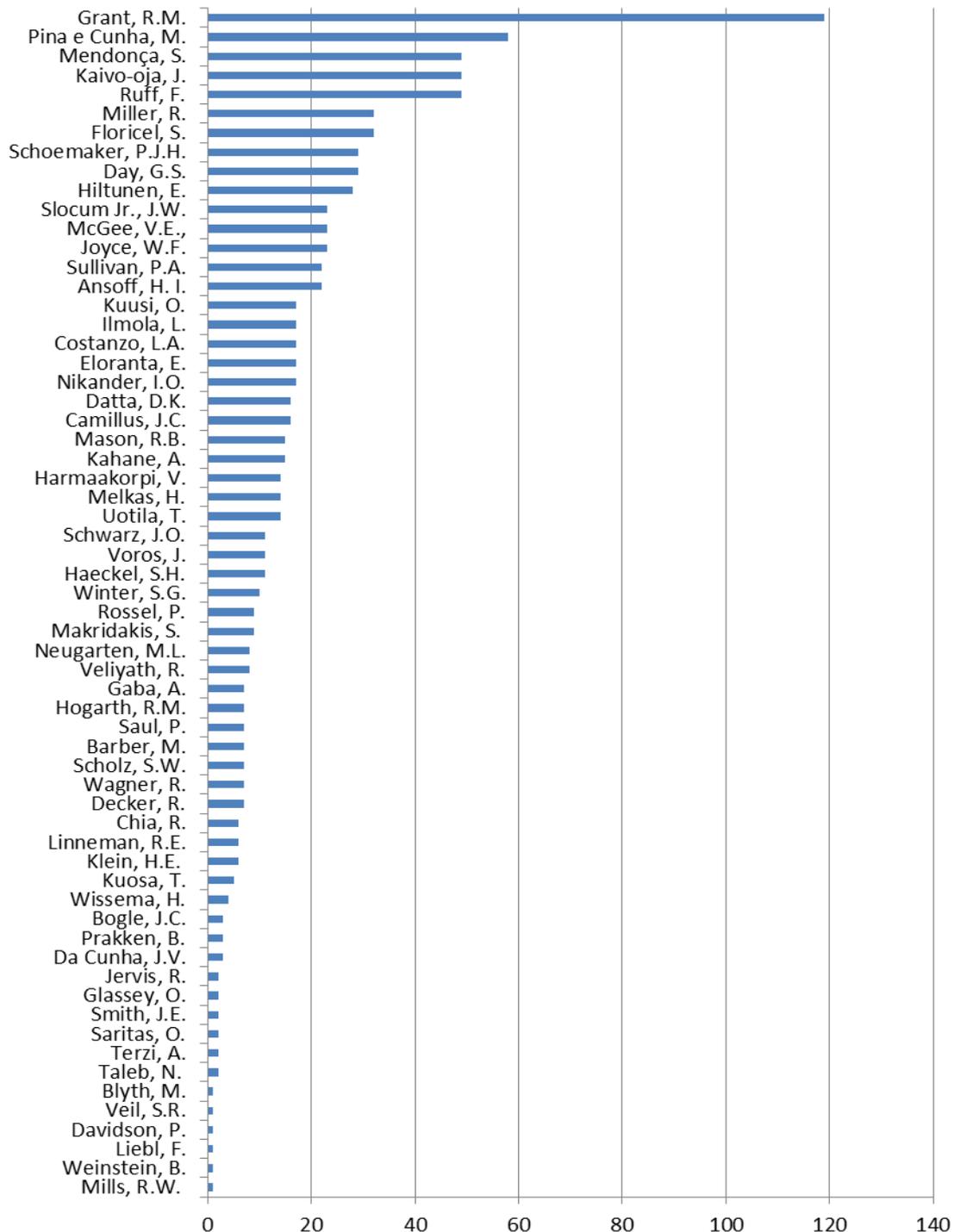
Figure 8 – Number of Citations per journal



Source: This thesis

It should be underlined that all citations received by the *Strategic Management Journal* correspond to a single article, Robert M. Grant’s “Strategic planning in a turbulent environment: Evidence from the oil majors”, published in 2003. Other most-cited authors include Miguel Pina e Cunha, Sandro Mendonça, Jari Kaivo-oja and Frank Ruff (Figure 9).

Figure 9 – Number of citations per author



Source: This thesis

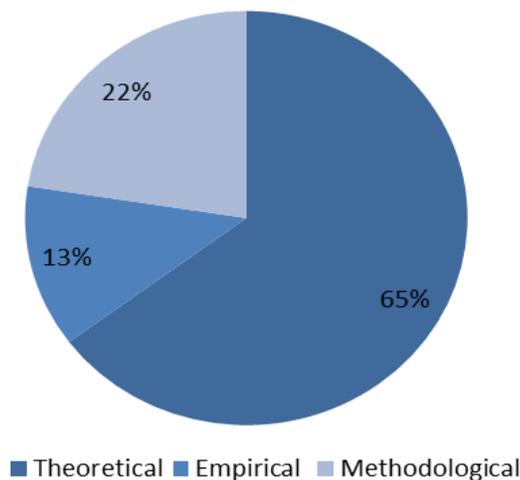
5.1.5 Research methods

Adapting the methodological approach used both by Varum and Melo (2010:357) and by EFMN (2009a), the articles were classified according to three types of methods of research:

- Theoretical - articles dedicated to the explanation or definition of theoretical concepts;
- Methodological - where new research methods or models are proposed or discussed;
- Empirical - papers focusing case studies or analysis of primary data.

After this classification, the theoretical articles were found to be predominant, adding up to 63% of the sample, followed by methodological articles comprising 23% and empirical articles corresponding to the remaining 14% (Figure 10).

Figure 10 – Articles published per research method (%)



Source: This thesis

As seen in Chapter, the concept of wild cards is not yet quite clearly defined; some confusion still subsists regarding the boundaries of the concept and its relation with other phenomena of change. This context may explain the majority of theoretical papers as a sign of an ongoing effort to address this issue. That is, the research effort is perhaps

focusing exactly where it should be if this is still a body of research in pre-paradigmatic stage (to use a Kuhnian term): theory building.

Theoretical articles are also, on average, the most cited, while methodological and empirical articles are considerably less cited (Table 3).

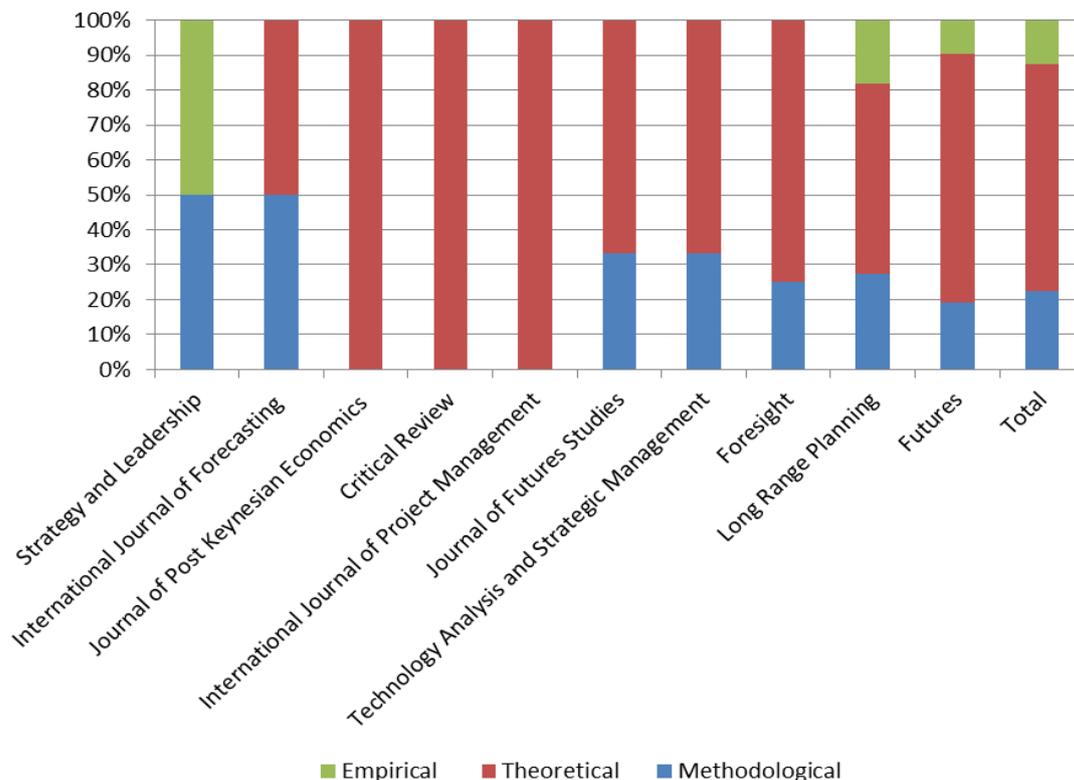
Table 3 – Average of citations per year per research method

| | Average per year |
|----------------|------------------|
| Empirical | 3 |
| Methodological | 4 |
| Theoretical | 11 |
| Total | 17 |

Source: This thesis

Regarding prevalence in terms of orientation, or asymmetries, between journals, it is possible to say that leading journals in this sample – *Futures* and *Long Range Planning*, the two top journals in the *corpus* - are more diverse in its publications than other journals, usually more concentrated in one, or at the most, two of the research methods (Figure 11). Nonetheless, considering the relatively limited number of articles in our sample this type of information must be read with caution.

Figure 11 – Articles published per research method and journal

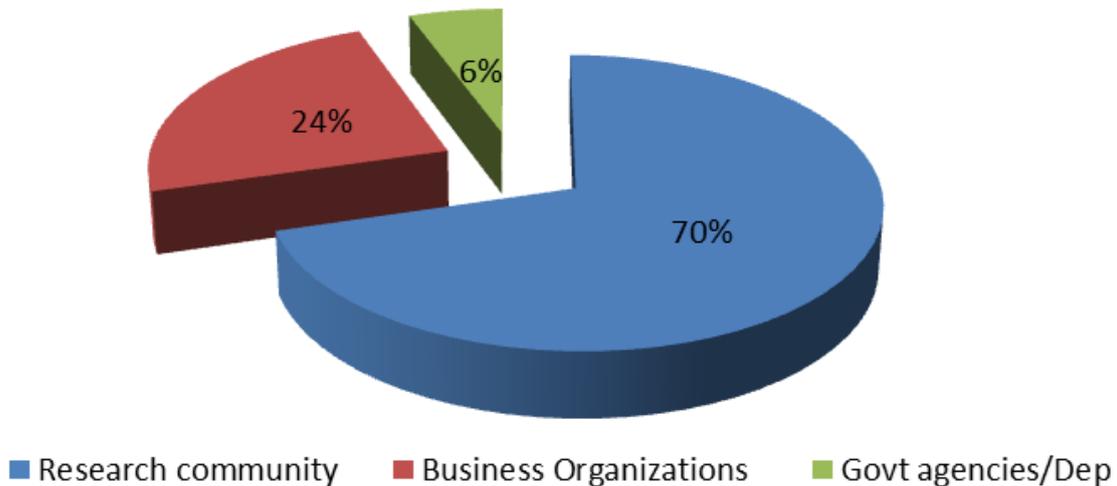


Source: This thesis

5.1.6 Target Groups

Concerning the main target groups, the following were considered: research community, business organizations and government agencies and departments. In this regard, the research community takes the lead, as could only be expected since the sample under analysis was focused on academically oriented journals (Figure 12). This is also consistent with the effort of theorization that the concept seems undergoing.

Figure 12 – Articles published per target group (%)



Source: This thesis

When considering the incidence of different types of articles correlating the target group and research method it is perceptible that theoretical articles are of more interest to the research community, and that business organizations have more interest in theoretical but also empirical articles. As for governmental agencies and departments they are more inclined towards theoretical and methodological research methods (Table 4).

Table 4 – Articles published per target group and research method

| | Research community | Business Organizations | Govt agencies/Dep | Total |
|-----------------------|--------------------|------------------------|-------------------|-------|
| Theoretical | 35 | 8 | 3 | 46 |
| Empirical | 5 | 4 | 0 | 9 |
| Methodological | 10 | 5 | 1 | 16 |
| Total | 50 | 17 | 4 | 71 |

Source: This thesis

5.2 Qualitative analysis

5.2.1 First person insights

With the manifest goal of including in this work empirical data both relevant and leading-edge regarding the object of study, as an important novelty feature and a particular contribution of this dissertation, an enquiry was sent to some of the top international specialists on foresight and wild cards.

Since the objective was having the opportunity to openly discussing the concept of extreme change with central actors in its research, the experts selected comprised three main groups, international foresight specialists (Table 5), editors-in-chief of the top publications on foresight and future studies (Table 6), and prominent Portuguese practitioners and scholars (Table 7).

Table 5 – International foresight specialists

| | | |
|--------------------------|-----------------------------------|--|
| Foresight Experts | Elina Hiltunen | Founder of What's Next Consulting Oy and Executive in Residence (visiting professor) at Aalto University, School of Arts |
| | Frank Ruff | Senior Manager of Social Environment and Trend Research |
| | Ian Miles | Economic and Social Research Council, UK government departments (DTI, DEFRA), |
| | Jennifer Cassingena Harper | Malta Council for Science and Technology |
| | Karlheinz Steinmueller | A future researcher at the Sekretariat für Zukunftsforschung in Gelsenkirchen. |
| | Kees van der Heijden | Co-founder, of the Global Business Network (GBN) in the United States |
| | Laura Anna Costanzo | Lecturer in Strategic Management, University of Surrey |
| | Luke Georghiou | PREST, Manchester Institute of Innovation Research, MBS University of Manchester |
| | Michael Keenan | PREST, Manchester Institute of Innovation Research, MBS University of Manchester |
| | Rafael Popper | PREST, Manchester Institute of Innovation Research, MBS University of Manchester |
| | Riel Miller | Head of foresight UNESCO |
| | Robert Bradley MacKay | Senior Lecturer in Strategy, University of Edinburgh |
| | Sandra M. Dingli | LECTURER of Foresight Techniques for Creativity and Innovation in University of Malta |

Note: Interviewed individuals' names in bold

Table 6 – Editors of the top publications on foresight and future studies

| | | |
|----------------|-----------------------|--|
| Editors | Ted Fuller | Futures Journal |
| | Armin Grunwald | Editor of the Book "On Prospective Technology Studies" |
| | Attila Havas | International Journal of Foresight and Innovation Policy |
| | Daniel Barben | European Journal of Futures Research (EJFR) |
| | Fred Phillips | Technological Forecasting and Social Change |
| | Gerhard Banse | Editor of the Book "On Prospective Technology Studies" |
| | Gerhard de Haan | European Journal of Futures Research (EJFR) |
| | Gordon Nelson | Editor of the Book "On Prospective Technology Studies" |
| | Harry Rothman | Technology Analysis & Strategic Management |
| | Imre Hronszky | Editor of the Book "On Prospective Technology Studies" |
| | Ing. Christine Ahrend | European Journal of Futures Research (EJFR) |
| | James Robins | Long Range Planning |
| | Marjolein van Asselt | Editor of the Book "Foresight in Action: Developing Policy-Oriented Scenarios" |
| | Ozcan Saritas | Foresight |
| | Philip Van Notten | Editor of the Book "Foresight in Action: Developing Policy-Oriented Scenarios" |
| | Reinhold Popp | European Journal of Futures Research (EJFR) |
| | Roberto Poli | Social Foresight (University of Trento) |
| | Susan van t'Klooster | Editor of the Book "Foresight in Action: Developing Policy-Oriented Scenarios" |
| | Tom P. Abeles | On The Horizon (OTH) |
| | Ulrich Reinhardt | European Journal of Futures Research (EJFR) |

Note: Interviewed individuals' names in bold

Table 7 – Portuguese practitioners and scholars

| | | |
|---------------------------|----------------------------------|--|
| Portuguese Experts | José Manuel Félix Ribeiro | Researcher at IPRI (Instituto Português de Relações Internacionais da Universidade Nova de Lisboa) |
| | António Alvarenga | APA (Agência Portuguesa do Ambiente) |
| | José Luís Almeida e Silva | IESE (Instituto de Estudos Sociais e Económicos). |
| | Paulo Carvalho | CML (Câmara Municipal de Lisboa) |

Note: Interviewed individuals' names in bold

From the 37 selected experts, it was possible to obtain 11 replies (9 international, 2 Portuguese), a response rate of 29.7%, listed in bold in Table 5, 6 and 7. The diversified background of the experts was specifically sought as especially suited for the exploratory and reflexive nature of this discussion. If gathering experts for a foresight exercise is business as usual, assembling them to discuss foresight itself is rarer and

seemed particularly interesting. Table 6 lists some relevant biographical information about the experts enquired, whose responses are compiled on the Appendix.

Table 8 – Biographical information about the experts enquired

| Name | Biography |
|-----------------------------------|---|
| Elina Hiltunen | Founder of What's Next Consulting Oy and Executive in Residence (visiting professor) at Aalto University, School of Arts, Design and Architecture. Elina Hiltunen's Doctoral thesis focused on <i>Weak Signals in Organizational Futures Learning</i> . She also published several papers on the theme like "Was It a Wild Card or Just Our Blindness to Gradual Change?" and "Scenarios: Process and Outcome, Crowdsourcing the Future: The Foresight Process at Finpro. |
| Frank Ruff | About two decades of practical experience in corporate foresight, applied industrial research and consulting. A trained sociologist, Frank Ruff is Senior Manager of Social Environment and Trend Research, a member of the Society and Technology Research Group of DaimlerChrysler in Berlin and Palo Alto (California). |
| Fred Phillips | Editor-in-chief of the journal <i>Technological Forecasting and Social Change</i> and author of the textbooks <i>Market-Oriented Technology Management</i> (Springer 2001), <i>The Conscious Manager: Zen for Decision Makers</i> (General Informatics 2003), and <i>The Technopolis Columns</i> (Palgrave 2006). Dr. Fred Phillips is Professor and Program Chair at the State University of New York and has been a consultant to such organizations as Intel and Texas Instruments. |
| Harry Rothman | Until the summer of 2013 Harry Rothman was Editor-in-Chief at <i>Technology Analysis & Strategic Management</i> . He has worked in science and technology policy studies for over 40 years. |
| James Robins | Editor-in-chief of the journal <i>Long Range Planning</i> . He is also an associate to the editorial boards of the <i>Strategic Management Journal</i> and <i>Global Strategy Journal</i> . James Robins' main areas of research are strategic management, corporate strategy, strategy theory, research methods, international ventures, knowledge transfer, and emerging economies firms. He served as Professor of Business Policy at the Vienna University of Economics and Business. |
| Jennifer Cassingena Harper | Director of Policy within the Malta Council for Science and Technology. Jennifer Cassingena Harper lectures in foresight at the University of Malta's Masters Programme in Innovation and Creativity. Her research interests include International Level Foresight and STI Policy |
| Karlheinz Steinmüller | A futures researcher at the Sekretariat für Zukunftsforschung in Gelsenkirchen. Karlheinz Steinmüller also researches the use of science fiction for future studies. He has developed scenarios on biomedicine and on unexpected discontinuities. He uses the term wild cards in his consultancy work. |
| Riel Miller | One of the world's leading strategic foresight designers and practitioners. Head of Foresight for UNESCO in Paris and currently a board member of the Association of Professional Futurists; Fellow of the World Futures Studies Federation; Faculty Member in The Master of Public Affairs at Sciences-Po in Paris; and a member of the board of Strax, The Research Unit for Strategic Intelligence and Exploration of the Future at Aalto University in Finland. |
| Ted Fuller | Ted Fuller is now Editor-in-chief of the journal <i>Futures</i> ; Head of the Business School in the University of Lincoln; Chair in COST A22 Foresight Methodology Project and Professor of Entrepreneurship and Strategic Foresight in the University of Teesside. He established two research centres at the University of Durham Business School (DUBS), one in Knowledge Systems and other in Foresight Research. |

Source: This thesis

Some of these experts were also identified in the bibliometric analysis of the *corpus*. For instance, Pierre Rossel authored four articles and Elina Hiltunen three articles included in the *corpus*, and Frank Ruff co-authored one of the five most cited articles. Others, like Karlheinz Steinmüller, were quoted in this dissertation several times, throughout the Chapters dedicated to the systematic survey of the literature. The opportunity to discuss the concept of extreme change with the editors-in-chief of the top journals of this field, Ted Fuller of *Futures* and James Robins of *Long Range Planning*, as well as with Harry Rothman of *Technology Analysis & Strategic Management* and Fred Phillips of *Technological Forecasting and Social Change* was invaluable.

Undoubtedly, the expertise on this matter of these specialists provided relevant and up-to-date information regarding the current areas of concern within foresight studies, in which wild cards are especially highlighted. The collection of this information is an important reinforcement of the findings from the quantitative analysis and the systematic survey of the literature.

5.2.2 Wild cards definition and identification

The concept of wild card is hard to ascertain and identify “*there is no perfect formula or methodology for that*” (Karlheinz Steinmüller, personal communication, May, 2013). If “*identifying events like this after they happen usually is not difficult, (w)e do not even become aware that they happened unless they have serious consequences*” (James Robins, personal communication, May, 2013).

However, several ways to detect wild cards have been forwarded through time. For instance, Fred Phillips in his answers mentioned his paper “A Method for Detecting a Shift in a Trend”, written in 1998, in which he “*shows how to detect it in the manufacturing learning curve situation. It can also be done in services, if learning/experience curves are tracked or can be calculated from management accounting data*” (Fred Phillips, personal communication, May, 2013).

Described as unexpected and unprecedented events that redefine future trajectories, wild cards have as main characteristics being “*unlikely: but high impact; maybe outside the paradigm of conventional - especially establishment thought. They are the bad thoughts/news that you don't want to tell the boss (or yourself)*” (Harry Rothman, personal communication, May, 2013). In theory, they can take place in “*all you can*

think of and that has the potential for it. We are talking about the future, so nothing is impossible, even if the possibility of occurrence is highly uncertain. But that is why that is even more important in the analysis and can often be the material defining the future” (José Luiz A. Silva, personal communication, May, 2013), and at any given *“point in time, in any location and context. They can take the form of natural and man-made events and can relate to all aspects of human and ecological well-being* (Jennifer Harper, personal communication, May, 2013).

In wild cards identification it is essential to *“open your eyes and to see and appreciate things you are not looking for”* (Karlheinz Steinmüller, personal communication, May, 2013) by *“brainstorming in mixed groups or just with the heuristic, think the apparently impossible”* (Frank Ruff, personal communication, May, 2013).

At the same time being aware that there is useful information you can gather from *“individuals and organizations at the forefront of several areas [of knowledge] that can more easily find and characterize wild cards”* (António Alvarenga, personal communication, May, 2013) and *“by thinking what are the most important things in your organization and what would you do if you would lose them”* (Elina Hiltunen, personal communication, May, 2013). The usefulness of combining people with different backgrounds, mentioned by Frank Ruff and António Alvarenga is also stressed by Ted Fuller for whom *“A process of challenge to norms produced from people with a different perspective might reveal unconsidered risks or threats”* (Ted Fuller, personal communication, May, 2013).

As mentioned in Chapter 3, in what concerns wild card detection and imagining, the concept of weak signals is seen by the experts enquired as a fundamental basis.

Nevertheless, both concepts are simple pieces of a more intricate puzzle that can only be understood through contextualization, learning and creativity: *“searching for weak signals (e. g. in a horizon framework) may also help (but interpretation is difficult). But: weak signals are found (they are news items); wild cards (that did not yet happen) have to be invented. You need imagination for that”* (Karlheinz Steinmüller, personal communication, May, 2013).

Wild cards main strength resides in their potential to tear apart established mental structures, in order to overcome preconceptions and axioms. The exercise of *“anticipating such changes requires one to elaborate the inter-dependencies of the ‘system’ or world-view and also to identify what such systems or world-views are*

‘open’ to (as in open systems). This is actually an impossible task. However if taken at the level of ‘what do people assume is possible’ and then extending this perspective; one can challenge received wisdom and show that it is necessary to challenge this in the event of some disruptive change”. (Ted Fuller, personal communication, May, 2013).

5.2.3 The importance of disruptive events and of wild cards analysis

The concept of disruptive events emerged in a very specific set of circumstances. In a fast changing and evolving world the *unthinkable* will undoubtedly take place, even if a specific event has a small probability of happening. According to the experts this realization seems an important motivation for wild card analysis.

The analysis of disruptive events, namely wild cards, that is, *“distressing events that makes it impossible to conduct ‘business as usual’ and to follow “normal” procedures.”* (Fred Phillips, personal communication, May, 2013) as a foresight tool in the comprehension of an environment full of uncertainty, turbulence and unpredictability is considered by the majority of specialists as of great importance, *“since they may be responsible for major breaks in the identified trends”* (José Luiz A. Silva, personal communication, May, 2013).

Karlheinz Steinmüller mentions that disruptive events and wild cards (as low probability disruptive events) analysis is important for four specific reasons:

1. to think about future implications, in order to *“try to get an idea of changes that lead beyond this ‘prolonged present’ as “really interesting things about the future are outside the scope of a linear extrapolation of the present state”;*
2. to broaden our perception, *“thinking about wild cards is a way to overcome limitations, (...) preconceptions, or limited perspectives, our prejudices - (...) trends close the future, wild cards open it up”;*
3. to come closer to the identification of *“emergent developments, sudden, surprising emergence of new things”;*
4. to act in times of disruptive change *“ there are phases of continuous, evolutionary change - and phases of turmoil, chaotic, disruptive change. For the first type of change, trends and extrapolations (and expert consensus) may be sufficient, for the second one has to rely on scenarios, wild cards, dissenting experts”* (Karlheinz Steinmüller, personal communication, May, 2013).

Therefore, the importance of considering disruptive events and wild card events should not be then ignored in decision-making and strategic preparation, as they “*frequently pose major risks (and sometimes opportunities) to any type of business activity, but sometimes also to the larger economy, society and politics*” (Frank Ruff, personal communication, May, 2013).

In fact, “*all organizations, companies, countries (...) must think of wild cards because they can have a devastating impact. Its low probability does not mean that they do not happen. When they do happen, they may even jeopardize the existence of the organization. It is therefore crucial to realize what they may mean, in order to not be destroyed by these events*” (António Alvarenga, personal communication, May, 2013).

This analysis is a determining factor in the preparation for sudden changes and contingency plans, to avoid being taken by surprise, since “*In certain cases where the effects of disruptive events are expected to be devastating, this prior planning and preparedness can prove crucial*” (Jennifer Harper, personal communication, May, 2013). Hence, it is also not surprising that the importance of the exploration of wild cards as a tool for “*Testing resilience: systemic, agent and conceptual; Broadening [the] range of potential systemic factors*” is especially underlined (Ted Fuller, personal communication, May, 2013).

The impacts of wild cards are considered “*the things in which the true management competence is estimated (...) The management of the companies who will survive is of course better than those that cannot survive*” (Elina Hiltunen, personal communication, May, 2013). Without wild card analysis, systems and companies can be caught unawares - “*it’s the punch that you don’t see coming that knocks you out*” (Harry Rothman, personal communication, May, 2013).

The great majority of the authors enquired emphasised the importance of wild cards analysis, even if “*companies are rarely ready to take potential disruptive events seriously. This is due to the fact, that most companies aspire for growth and business success and thus thinking about disruptive events ‘disturbs’ the optimistic mind-set that is part of growth strategies. Mentally it is difficult to spread untroubled beliefs about growth, success etc. and at the same time think seriously about ‘disruptive events’*” (Frank Ruff, personal communication, May, 2013).

James Robbins, however, alerted that while it is important to be mindful of unanticipated events it is rather impossible to anticipate them, since “*they are often caused by the unexpected intersection of unplanned behavior that creates an event thought to be unlikely - Human behavior lies at the bottom of most real ‘wild cards’.*” (James Robbins, personal communication, May, 2013).

Lastly, Riel Miller downplayed the importance of wild cards, thinking about them as a “*fairly small sub-set of (...) contingency futures – preparation for imaginable (usually already known and modelable) external events*” (Riel Miller, personal communication, May, 2013). Nevertheless, a consensus between these authors is found regarding the central role of wild card analysis for preparation against extreme change, in line with the findings on this matter derived from the systematic literature survey and included in Chapter 3.

5.2.4 Anticipation and reaction to wild cards

Anticipating wild cards is almost unanimously considered as a very difficult job to accomplish, as James Robbins states, “*anticipating them is deeply problematic because they are constructed by human behavior and random chance. Behavioral economics probably can help a little to narrow the range of wild card events, but the element of random collision among humans cannot be anticipated*” (James Robbins, personal communication, May, 2013). In fact, anticipating wild cards “*is much harder than identifying them after the fact*” (Fred Phillips, personal communication, May, 2013). Ted Fuller agrees with this view considering that “*identify[ing] ‘surprises’ rather than consider[ing] their effects is much more difficult. That is why they are called surprises*” (Ted Fuller, personal communication, May, 2013).

The detection of wild cards is even harder as “*there are no sure-fire techniques. Recall the many variants of Murphys Law. ‘If something can go wrong it will’, and its corollary ‘Murphy is an optimist.’*” (Harry Rothman, personal communication, May, 2013).

Karlheinz Steinmüller argues the difficulty can be seen in 3 distinct stages:

1. in the process of identification, “*really difficult intellectually, since you take refuge to imagination, and there is always a lack of imagination and at*

the same time a surplus of it), estimating their likeliness and their closeness (even more difficult since you have no standards, no benchmarks for that)”;

2. in the preparation for its impact, *“(difficult on the practical level, since nobody wants to invest effort in something that most probably may not arrive - among hundreds of equal contingencies)”;*

3. in the reacting to them, *“(even more difficult on the practical level, since most decision makers are surprised and react without plan, e.g. purely symbolic or outright counterproductive)”* (Karlheinz Steinmüller, personal communication, May, 2013).

Anticipation of a wild card and reaction to a wild card are therefore complementary approaches to this problem. In the anticipating arena, *“multiple perspectives on the phenomenon under analysis”* (Ted Fuller, personal communication, May, 2013) is always desirable. When trying to develop organizations’ future awareness and flexibility, *“simulations and drills are effective ways to prepare”* (Riel Miller, personal communication, May, 2013).

For this exercise to be both comprehensive and useful, *“thinking alternative futures that include also wild cards”* (Elina Hiltunen, personal communication, May, 2013) can use a wide range of foresight tools like *“horizon scanning, scenarios, forecasting”* (Jennifer Harper, personal communication, May, 2013).

This necessity for an inclusive approach to the notion of extreme change, embodied in the concept of wild cards, is much more visible since the illusion of a deterministic universe has long faded: *“For example: non-linear models, catastrophe theory, chaos theory, cybernetic modelling - especially importance of Ashby's law of requisite variety, dialectical theory- quantitative change leading to qualitative change - unity and struggle of opposites - negation of the negation and so forth”* (Harry Rothman, personal communication, May, 2013). Therefore, integrating wild card analysis within general foresight studies addresses the need for *“models which have change built-in”* (Harry Rothman, personal communication, May, 2013).

Since this exercise must be broad and multidimensional, *“such perspectives cannot come from the people who live their everyday lives within the field of study, as arguably their existing set of assumptions make re-conceptualisations quite difficult”* (Ted Fuller, personal communication, May, 2013).

As such, the exercise should be extended *“to participants with more general knowledge, i.e. live evidence, people with different perspectives and experiences that add to the discussion.”* (António Alvarenga, personal communication, May, 2013). José Luiz A. Silva adds to this view considering as essential a *“critical observation of reality and in the listening / research by a broad range of stakeholders / experts who can think outside the box.”* (José Luiz A. Silva, personal communication, May, 2013). This notion is furthered by Harry Rothman’s defence of a non-conformist perspective: *“always have some skeptics, non-conventional thinkers, outsiders to provide scenario inputs especially if they make you sick or angry... they might be right. Everybody said Marx was finished in 1990 but his ghost bit the orthodox freemarket economists’ egos in 2008... and we still await the predicted recovery five years on”* (Harry Rothman, personal communication, May, 2013).

This multidimensionality, of course, also comprehends peripheral vision and relational capital, since it is necessary to be *“aware of work outside one’s narrow field. This in turn depends on having connections (personal or via reading) with such work. These connections can be analyzed by modern network theory, bibliometrics, etc.”* (Fred Phillips, personal communication, May, 2013).

These anticipation efforts enable the definition of possible strategic reactions, *“contingencies, developed depending on the potential impact of the threat, along with a monitoring for signs of possible escalations. An alternative approach is the development of real options, which can be triggered in the event of a particular circumstance”* (Ted Fuller, personal communication, May, 2013).

If reacting to disruptive events is difficult it is *“because it nearly always involves changing ones mental model or theory of how the particular world (the field that we are involved in) works, and having enough people share this new mental model. This is [of] course part of the reason for undertaking foresight exercises; but seldom are they inclusive enough. Such times also offer great opportunity for reshaping normalities.”* (Ted Fuller, personal communication, May, 2013).

5.2.5 Emergence of future wild cards

In James Robins words *“to use a crude metaphor, this is a little like heating molecules, Brownian motion increases, random collisions of behavior increase, and there are more bizarre events”* (James Robins, personal communication, May, 2013).

There seems to be a tendency to, as the *“uncertainty increases, and as we realize the rapid pace of change, always faster and deeper (incidentally a feeling that has always happened since antiquity) (...), more wild cards will arise, as well as in subsequent periods are likely to emerge more and so on. With the emergence of more players / actors the dose of uncertainty will grow ever more”* (José Luiz A. Silva, personal communication, May, 2013).

Frank Ruff argues that the *“number of ‘wild cards’ that happen in a defined period is a mix of: 1. real major disruptive events or developments happening; 2. a matter of perception/construction of these events or developments in society or in companies”* (Frank Ruff, personal communication, May, 2013). Therefore, due to the increasingly complex nature (social, environmental and economic) of nowadays world (James Robins, personal communication, May, 2013; Fred Phillips, personal communication, May, 2013; Ted Fuller, personal communication, May), where *“the pace of technological change and the impacts on society and the ecology is growing incrementally”* (Jennifer Harper, personal communication, May, 2013); the number of “wild cards” seems prone to increase.

5.2.6 Examples of wild cards

Experts’ responses also point out some possible sources of emergent wild cards, which can be organized according to the PESTE framework. The experts’ contributions were compiled and categorized using the PESTE framework on Table 9. A total of 52 wild cards were collected, with possible future wild cards emerging predominantly on the technological field (15), corresponding to a percentage of 28,8% of the total.

In the political arena, *“ the ‘Arab Spring’ is not over it is still developing and could move further East bringing in Israel & Iran; or South destabilising Western & Southern Africa.”*. Also, remains to be seen whether *“the changing and weakening relative power of the USA will affect their domestic politics (...), as are the profound demographic ethnic changes that are occurring there. There are strong groups in USA who are being weakened politically, potentially driven from federal power within the present 2 party structure - the political map of America looks unstable to me, how will they respond?”*. (Harry Rothman, personal communication, May, 2013).

Table 9 – Examples of possible future wildcards

| | P | E | S | T | E |
|-----------------------------------|---|--|---|---|---|
| Harry Rothman | <ul style="list-style-type: none"> - Eurasian religious war, - Assassination US President, - Regional nuclear war, - Military defeat of Israel, - Collapse of EU after revolts in Mediterranean states | | | <ul style="list-style-type: none"> - Effective fusion power, - Human brain ageing reversible, - Brain transplant successful, - 3D printing universalized, - First successful human/nonhuman chimeras | <ul style="list-style-type: none"> - Toba scale volcanic eruption, - Impact event on major city, - Lethal strain common airborne disease, - Sun storm crashes all GPS |
| Elina Hiltunen | <ul style="list-style-type: none"> - War, - Riot | <ul style="list-style-type: none"> - Sudden death of key personnel, - Industrial spying, - Failure in product - Sudden increase of product demand. | <ul style="list-style-type: none"> - Losing ones job, - Accident, - Disease, - Lottery win, - Pandemia | <ul style="list-style-type: none"> - Computer network collapse, - Major computer virus, - Cyber war, - Nuclear disaster, - Electric cut down | <ul style="list-style-type: none"> - Natural catastrophe, - Meteorite |
| Karlheinz Steinmüller | <ul style="list-style-type: none"> - Break up of the United States, - Shift of global manufacturing center back to Europe, - Chinese on the Moon before 2020 | <ul style="list-style-type: none"> - Oil price jumps | <ul style="list-style-type: none"> - Male fertility suddenly declines all over the planet to near zero, - Global pandemic | <ul style="list-style-type: none"> - Cold fusion really works, - Lovelock's "morphogenetic field" proved to exist | |
| Frank Ruff | | <ul style="list-style-type: none"> - Sudden fall of demand (e.g. because of economic recessions, | | <ul style="list-style-type: none"> - Remote hacking of communication | <ul style="list-style-type: none"> - Extremely restrictive regulation (e.g. on CO2) |
| Riel Miller | <ul style="list-style-type: none"> - World war | <ul style="list-style-type: none"> - Financial instability | <ul style="list-style-type: none"> - Pandemics | | <ul style="list-style-type: none"> - Climate change induced storms, - Rising sea level |
| Jennifer Cassingena Harper | | | | <ul style="list-style-type: none"> - Weather controlled by humans, - Underwater cities | <ul style="list-style-type: none"> -Green noiseless transport |

Source: This thesis

At the economic level the future looks grim, since *“the financial economic crisis affecting Europe and USA [is] still developing, and out of control... one recalls that 1929 and the thirties in Europe & American was not resolved without a world war, which enabled appropriate restructuring and temporary stability”* (Harry Rothman, personal communication, May, 2013). Ted Fuller has a slightly more optimistic vision: *“because of counteractions (regulations of financial markets and institutions, fiscal pacts, deleveraging in credit-financed markets etc.) the likelihood that we will have a major financial crisis in the next 10 years is lower, but we will probably see some smaller aftermaths of this crisis for another 10-15 years”* (Ted Fuller, personal communication, May, 2013).

On the technological field, environmental disasters *“are wild cards, and they are expected to increase because of climate change”* (Elina Hiltunen, personal communication, May, 2013). In fact, attention should be given *“to find resources for another 2-3 Billion people by 2050, assuming no catastrophic fall in population (think out possible ways this might occur?) The attempts to contain CO2 levels look to have failed”* (Harry Rothman, personal communication, May, 2013).

Harry Rothman also stresses that *“the communications revolution has not worked itself out yet... will it lead to greater potential for democratic freedom and opportunities to control governments or the reverse, perhaps in the name of protecting us against “terrorism”? Is it opening up a greater technological vulnerability”* (Harry Rothman, personal communication, May, 2013). Curiously, in his response Rothman anticipated the high profile episode of Edward Snowden’s denunciation of cyber espionage supposedly done by the National Security Agency of the USA.

An increasingly complex and integrated world *“generates uncertainty because many individual decisions are made and the combinations of these are unpredictable. At the same time the complexity is further amplified by media (including social media) so we actually are more aware of disruptive or risky events.”* (Ted Fuller, personal communication, May, 2013). Agents’ interrelations are much more dynamic, transversally impacting all aspects of society, even the production of knowledge and technology. Facts like the *“growth of online collaboration tools and team science means more connections (via ‘weak ties’) will be brought to every research project”* (Fred Phillips, personal communication, May, 2013).

It is possible then to see how “*vulnerabilities in human socio-technical systems and the possibility of deliberate or accidental manipulation have created a fertile field for disruptive, unanticipated events*” (James Robins, personal communication, May, 2013). For instance, “*a false story about Barack Obama being injured was published. High velocity trading programs now scan news feeds on twitter using text recognition programs and automatically execute trades. The US market fell by 150 points in seconds and then recovered when the news flash was declared false*” (James Robins, personal communication, May, 2013).

However, some authors argue that enhanced awareness to these kinds of events, as well as the development of better technological solutions, may override the increasing potential for wild card emergence.

As Ted Fuller says, “*our higher aspiration for "controlling events" contributes to the perception that there are more wild cards we have to cope with. On the other hand, the problem-solving capacities are growing. Both effects together lead me to the conclusion, that we will experience more or less the same level of disruptive events in the future*” (Ted Fuller, personal communication, May, 2013).

While others underline that there is “*no reason to assume that the next five years are more prone to wild cards than the past five years. (We always live in a time of change, more or less chaotic change.)*” (Karlheinz Steinmüller, personal communication, May, 2013). António Alvarenga defends that “*natural temptation is to say that more wild cards will happen, because the world is becoming more complex, turbulent and unpredictable. However, when looking to the future there are other forces of change that must also be considered like drivers, uncertainties, heavy trends, weak signals, etc ... At present, some of the traditional wild cards are becoming uncertainties and as such may even come to be fewer wild cards. For example, 5 or 10 years ago the chance of a very strong crisis in the Euro would be a wild card, but today the probability of a fragmentation of the Euro has increased a lot and only seems like an uncertainty. Periods of great agitation can actually increase the number of new wild cards, but on the other hand, some of the traditional wild cards now only constitute uncertainties due to a large increase in their probability of occurrence. Therefore, it is not possible to say whether an increase in wild cards in the next 5 years will happen or not.* (António Alvarenga, personal communication, May, 2013).

In spite of the obvious necessity to adequate the wild cards identification exercises to the problem under analysis, since “*the wild cards identified must be firmly linked to the focus (does not have to be close to it, but must be of special relevance and impact regarding that specific focus, and not simply generic)*” (António Alvarenga, personal communication, May, 2013), the enquiry asked specialists to give some actual examples of possible future wild cards.

In fact, and even though “*listing examples for "disruptive events" without context does not make much sense and we do not have an aggregated list of wild cards*” (Frank Ruff, personal communication, May, 2013) some examples can make the concept clearer.

Karlheinz Steinmüller states that “*you can invent hundreds of wild cards by simply taking as true what freaks, conspiracy theory adherents, marginal scientists, etc. claim. But it is not so easy to select the really interesting ones* (Karlheinz Steinmüller, personal communication, May, 2013).

Elina Hiltunen interestingly also presented a few examples of events on a personal scale, like “*loosing ones job, accident, disease, etc.*”, a perspective not often found on the literature (Elina Hiltunen, personal communication, May, 2013).

5.2.7 Wild cards - Concept cloud

There is no exact synonym to the wild cards concept. It is possible to harvest a number of close-by words used to identify and describe the concept. The following word cloud resulted from the collection of the related terms forwarded by the experts, adding up to 27 synonyms for the concept of wild card (Figure 13)

They are sometimes mentioned as “*mindquakes, disruptions, discontinuities*” (António Alvarenga, personal communication, May, 2013). Other terms used are “*disruptive events*”, “*trend break*”, “*trend reversal*” (Frank Ruff, personal communication, May, 2013); or “*unexpected event, high impact surprise, unknown power, effect outside normal limits, unconsidered possibility that happens, symmetry breaking effect, high power effect, resilience breaking*” (Ted Fuller, personal communication, May, 2013); or “*disruptors or ruptures*” (Jennifer Harper, personal communication, May, 2013); and “*cascading discontinuous events (Marcus Barber); series [of] interacting events rather than one off*” (Harry Rothman, personal communication, May, 2013).

disruptors or ruptures), to break normality (*effect outside normal limits*), and even rupture mental frameworks (*mindquakes*), as well as reshape the future (*trend break, trend reversal*).

It is also interesting the idea that besides single events, wild cards can also be a series of interrelated and interacting events (*cascading discontinuous events, series [of] interacting events rather than one off*).

Finally, when analyzing wild cards in the specialized literature, they are generally characterized as low-probability events. Accordingly, as Karlheinz Steinmüller points out, “*expressions like disruption (disruptive event) or rupture say nothing about probability.*” (Karlheinz Steinmüller, personal communication, May, 2013).

5.2.8 Foresight and wild cards - Portuguese views

Foresight in Portugal is still a relatively understudied subject. There were however some important efforts in its analysis and development, mostly undertaken by the Department of Foresight, Planning and International Affairs (Departamento de Prospectiva e Planeamento e Relações Internacionais - DPP) in the 1990s and early 2000s. In 2012 though, this organism was substituted by the Portuguese Environmental Agency (Agência Portuguesa do Ambiente - APA) losing just about all of its “foresight” attributions (DL. 56/2012).

In order to analyse the current situation of foresight in Portugal an enquiry was conducted. Five Portuguese specialists were contacted and even though only two responded, their answers proved to be very interesting.

When asked in what extent foresight could contribute to improve the competitiveness of Portuguese domestic firms and why it is not used, both José Luiz A. Silva and António Alvarenga agreed that it could effectively be a positive contribute. As they argue, “*facing uncertainty makes thinking about the future much more important*” (José Luiz A. Silva, personal communication, May, 2013), as “*those who cannot see ahead, face the full spectrum of impact*” (António Alvarenga, personal communication, May, 2013).

José Luiz A. Silva adds that in fact “*there are several claims of several Futurists that support this statement. As Roland Berger states, the faster you drive a car farther should the headlights illuminate, in order to anticipate the risks that may arise. Or "the*

longer it takes to grow a tree, the less you should expect to plant it" (Gaston Berger)" (José Luiz A. Silva, personal communication, May, 2013).

For António Alvarenga, *"foresight strengthens perception of the future (...), the inherent discussion allows the consolidation of visions of the future through the cross validation of various arguments, thus promoting a shared resulting strategy"* (António Alvarenga, personal communication, May, 2013).

António Alvarenga defends that still *"all organizations do have their vision of the future. However, some work it best, others not so much. There are some Portuguese institutions that use foresight, others use different techniques, but all do trend and factors analysis, seeking to develop a strategic vision in order to deal with the future"* (António Alvarenga, personal communication, May, 2013).

However, Portuguese organizations are not very "forward-looking", perhaps a cultural characteristic so *"only slowly and at length can these behaviors be changed. Note that the government itself extinguished in recent years the main and most important body of forward thinking and strategic (DPP - Department of Foresight and Planning) without any public outcry."* (José Luiz A. Silva, personal communication, May, 2013).

Consequently, Portuguese economy has suffered greatly from unexpected impacts: *"China's entry into the WTO and its rise in the international economic landscape, the EU enlargement to the east, Euro crisis, were predictable processes, not wild cards, but most of the Portuguese business failed to position itself accordingly". The great Portuguese economic groups were the exception, Sonae, Jerónimo Martins and PT were some of the few who could see what the future might bring and adapted"* (António Alvarenga, personal communication, May, 2013).

The great majority of Portuguese organizations, though, *"like to decide on a daily basis. Foresight and reflection require additional work and do not have immediate effects"* (José Luiz A. Silva, personal communication, May, 2013).

The same attitude can be seen in Portuguese management. There is not an inclination towards anticipation efforts and foresight processes among Portuguese leaders: *"when everything goes well they can do without it [foresight], and when everything goes wrong, it is already too late to see further than the tip of the nose: it is simply necessary to react, and quickly."* (José Luiz A. Silva, personal communication, May, 2013).

Since, identifying wild cards will depend always on the focus, for the Portuguese economy, the following possible examples were mentioned by Alvarenga: *"a Nuclear*

accident in Spain, end of the Euro, cures for diseases, energy with no costs, end of the European Union, war in Europe, an oil spill, terrorist attack, earthquake in Lisbon". He also forwarded possible examples of questions/problems to address in scenarios on the Portuguese economy: "*the future of the Portuguese public administration, the future of mobility in Portugal, or the future of the automobile*" (António Alvarenga, personal communication, May, 2013).

5.3 Discussion of the major results

The bibliometric analysis done in Chapter 5.1 enabled the identification of broad features of the concept's evolution. The research on this subject resurged in 2000s, when the number of articles published increased steeply, especially between 2010 and 2012. In this three year period an average of 7.7 articles were published each year, amounting to 32% of all the articles included in the *corpus*.

Looking at the main outlets for the discussion and dissemination of the work done in this matter, *Futures*, *Long Range Planning* and *Foresight* clearly stand out. Together these three journals published more than 50% of the articles in the *corpus*, making them the starting point for research on this subject. Curiously, in his answers to the enquiry James Robins, presently the editor-in-chief of *Long Range Planning*, indicated that in its evolution this journal is shifting away from its initial emphasis on strategy process, perhaps altering its standing as a main publishing venue for research in the field of foresight.

The articles included in the *corpus* included the work of more than 98 authors working in 18 countries. If considered on aggregate, 50% of authors hail from the Europe. Curiously, while predominant, contribution of US authors to the field of foresight and the sub-field of wild cards seem ad-hoc and fragmented.

Authors with the more articles included in the *corpus* were Pierre Rossel and Miguel Pina e Cunha (four each), followed by Jan Oliver Schwarz, Sandro Mendonça, Jari Kaivo-oja and Elina Hiltunen (three articles each). Pierre Rossel and Elina Hiltunen also provided invaluable information as two of the experts enquired on Chapter 5.2.

From the five most cited articles in the *corpus*, only the second most cited "Wild cards, weak signals and organisational improvisation", authored by Miguel Pina e Cunha, Sandro Mendonça, Jari Kaivo-oja and Frank Ruff, published in 2004 in the journal

Futures, with a total of 44 citations, addresses specifically the concept of wild cards, linking it to the concept of weak signals as a possible tool for wild card anticipation.

As for the most cited journals, *Futures* (123 citations), *Strategic Management Journal* (119) and *Long Range Planning* (104 citations) published the articles in the sample that collected more citations, in fact, a percentage of 63% of all citations.

Finally, the most cited author on the sample was Robert M. Grant's, due to his article "*Strategic planning in a turbulent environment: Evidence from the oil majors*", published in 2003. However, this paper emerges as an outlier, since it is an article only marginally linked to foresight and published on a non-core journal, illustrating that even though Europe gathers considerable critical mass on this subject, US authors amass more citation "hits", a usual trend in the research within social sciences.

Theoretical articles amounted to 65% of the sample, followed by methodological articles with 22% and empirical articles with 13%. Theoretical articles were also the most cited, on average, yearly. A situation indissociable of the ongoing efforts for better defining and understanding the complex concept of extreme sudden change events, wild cards. Both the bibliometric analysis and the systematic survey show the serious effort that is being done to clarify this concept and its role within future studies.

Futures and *Long Range Planning*, as the top and most influential journals are the ones that show increased heterogeneity, publishing articles of all methods of research, thus showing an overture to all relevant contributions on the field.

The identification of the articles' method of research was also useful to analyse the correlation between the method and the target group. Therefore, 3 target groups were considered, "research community", "business organizations" and "government agencies/departments". Most of the articles targeted the research community, as expected, since most of the articles are written to academics and directed to discussion within the academia. Consequently, of the 50 articles meant for the research community, 35 were theoretical. Nevertheless, business organizations and government agencies/departments also proved keener on theoretical articles, perhaps showing that these two target groups are also interested in following the academic research on this matter.

The bibliometric analysis allowed the identification of a number of articles and authors relevant to the study of the concept of wild cards. These articles were afterwards analysed due to their importance as an information source on the subject.

Therefore, the literature survey enabled a broader examination of the research done so far on wild cards and its main directions and interrelations with other Foresight concepts like weak signals. It is now possible to argue on a more evidence-based manner that wild cards stand for the disruptive and extreme force of sudden unexpected change. Wild cards are new, unexpected, improbable (low probability), single or cascading associated events, with high, uncontrollable, trend creating/trend breaking, impacts, potentially disrupting systemic reaction/adaptation, perhaps even redefining future evolution.

Several terms are used as synonyms of wild cards like *surprises*, *discontinuities*, *disruptive events*, *structural breaks*, *bifurcations*, *systemic breaks*, *shocks*, *abrupt* and *discontinuous bursts*, *faites porteurs d'avenir*, *dislocations*, *trend breaches*, *paradigm busters*, *disruptions*, *mindquakes*, *trend break*, *trend reversal*, *unexpected event*, *unknown power*, *high impact surprise*, *effect outside normal limits*, *unconsidered possibility that happens*, *symmetry breaking effect*, *high power effect*, *resilience breaking*, *ruptures*, *cascading discontinuous events*, *steep surprises*. These expressions help to a more clear understanding of this concept's true meaning. For instance, wild cards importance in overcoming mental frameworks and preconceptions (*mindquakes*), or as an essential tool for testing the resilience of our vision of the future or that of organizations or systems (*resilience breaking*). Listening to the experts' first-hand views was a complementary source of insight in this respect.

There are also similar concepts that nonetheless show great proximity, in spite of some differences, with the one of wild cards, like *black swans* and *crisis*. Consequently, this shows how difficult it is to define this concept and how it can be said that its limits are not yet clear. As such, all these expressions cannot be seen as synonyms, as they are all just a parcel of the concept's full meaning and so an intrinsic part of it.

This study also sought to examine the potential use of weak signals in the detection of wild cards, as defended by several authors (Petersen, 1999; Cornish, 2003; Mendonça *et al.*, 2004; Hiltunen, 2006:62, 71; Holopainen and Toivonen, 2011:3; Rossel, 2012:236), but at the same time clearly differentiating the two concepts. Weak signals emerge in the literature *early symptoms*, *imperfect warnings*, *partial* and *incomplete* (Ansoff, 1984:369; Rossel, 2009:308; Mendonça *et al.*, 2012), *germs* (Godet, 1993 in Kuosa, 2010:43), *early warning signs*, *emerging issues*, *seeds of change* (Hiltunen, 2008b:247; Glassey, 2009:321), which can be *of human nature (internal or external)*; *of textual nature (published and internal documents sources)*; and *of online nature (internet*

sources) (Hiltunen, 2008a:24), difficult to discern amongst “*general noise*” (Coffman, 1997c), but that may be anticipating future changes (Mendonça *et al.*, 2004; Rossel, 2009; Saritas and Smith, 2011; Heinonen and Hiltunen, 2012; Mendonça *et al.*, 2012; Rossel, 2012), helping organizations to identify potential future opportunities and threats (Wissema, 2002; Schwarz, 2009). Our interviewed experts echoed this line of thought and we infer they see them as a way to anticipate wild cards. However, even if early detection is not possible, weak signal scanning increases peripheral vision, avoiding tunnel vision and unexpected stumbles on unforeseen surprises.

Listing some highlights of the experts’ answers it is possible to see that they confirm and validate some of the findings surfacing in our study:

- Wild cards are extremely difficult to identify, since they are new, unlikely and unforeseen events that can be originated in all facets of life and occur in any place or time imaginable. However, their identification is crucial as their impact can be devastating. Weak signals scanning may prove invaluable in anticipating wild cards. In this scanning a multidisciplinary, wide-ranging, perspective should be engaged and the limits and scope of the search must be perpetually expanded. Through this process, mental frameworks should also be defied, deconstructed and, subsequently, remodelled.
- Disruptive events should be considered and included in Foresight analyses as they strengthen and widen futures studies. Wild cards are a test of resilience, since they challenge simple, optimistic, views of the future. They allow more robust, flexible and shared, contingency plans, that is, alternative strategic options to face extreme change;
- Growing environmental turbulence, dynamism and complexity increases uncertainty and, consequently, the emergence of wild cards. Political, economic and technological areas seem prone to the advent of future wild cards. However, the development of new technological solutions may avert the emergence of some wild cards. Also, the world has always been complex, in a state of perpetual change and uncertainty, so why more wild cards should be expected in the future than up until now?

Looking specifically to specifically to the Portuguese view on foresight and wild cards, António Alvarenga and José Luiz A. Silva forwarded some interesting insights on this matter:

- Foresight in Portugal is still underdeveloped, even if some organizations already use some of its tools or somewhat similar techniques;
- Foresight could significantly contribute to improve the competitiveness of Portuguese organizations. Some of the external shocks that negatively impacted the evolution of Portuguese economy could have been foreseen and, consequently, adaptation was possible. The Portuguese government contributed to this gap by extinguishing one of the more relevant institutions dedicated to the study of foresight in Portugal, the DPP;
- A growth model based on the exploration of lower labour costs was effective in the 60s and 70s in Portugal, attracting significative foreign direct investment. However, changing global conditions rendered this model obsolete. A more global economy confronted Portugal with new competitors, at the same time with greater availability of cheap labour and increased technological integration in products and services. Portuguese organizations are not forward-looking, traditionally having a more reacting attitude rather than proactive. Inertia to change is always strong; it is even stronger when the objective is to move past a model that used to be successful. The structural imbalances resulting from the difficulty of Portuguese organizations to face increased competition for global markets did not manifest themselves earlier due to the calming effect of the EU Structural Funds and the general decrease of the interest rate for external loans. The organizations with better future awareness like PT, SONAE, Jerónimo Martins, were the ones able to quickly adapt to the new conditions.

The current economic state of affairs constitutes a prime opportunity to test in Portugal the potential of Foresight, integrating wild card analysis, for launching comprehensive discussions regarding possible future strategies with structural implications. For example, António Alvarenga suggested focuses like “the future of the Portuguese public administration” or “the future of mobility in Portugal”. Many others could be listed with enough interest and relevance to mobilize several sectors of society for a constructive debate. One of foresight’s main strengths is its ability to inspire communication and meaningful and inclusive strategic discussions.

5.4 Preliminary conclusions

Overall, through the bibliometric analysis a set of key findings were gathered allowing a snapshot of this field's evolution.

In fact the total number of relevant articles in this sub-field is coming out mostly in the 2000s, particularly between 2010 and 2012, in journals like *Futures* (which published 30% of all the relevant articles), *Long Range Planning* (15%), and *Foresight* (6%). Regarding authors' countries of affiliation, the majority are from the US (34%), Finland (13%), Germany (11%) and Britain (9%). Concerning the research method used on the papers, the theoretical articles are predominant (65% of the sample) as are the research community (70% of all papers) as the target group.

The qualitative analysis of the experts' insights provided important information regarding the current areas of concern within foresight studies, in which wild cards are especially highlighted. Wild cards are defined as unexpected and unprecedented events that redefine future trajectories. Although anticipation and/or reaction are very difficult, are also essential to survival in an uncertain environment.

In spite of not being clear whether growing environmental turbulence, dynamism and complexity may increase the emergence of future wild cards, disruptive events should be considered and included in foresight analyses as they strengthen and widen futures studies. Wild cards are a test of resilience, challenging simple, optimistic, views of the future and expanding mental frameworks allowing more robust, flexible and shared, contingency plans. In this process, weak signal scanning may prove invaluable.

In the next Chapter, final conclusions are presented, summarizing this dissertation's main contributions to the research on this field, as well as limitations of this study and suggestions of further future research.

6. Conclusions

This thesis approached the foresight concept of wild cards in three ways: a traditional literature review, intended to precisely identify the boundaries of the concept of wild cards, its meaning and added value to the field of foresight; a systematic survey of the literature, i.e. a bibliometric analysis, aimed at ascertaining the evolution of the concept, its diffusion and key actors of the on-going research; and an enquiry submitted to international experts, as an exploratory and reflexive exercise based on a direct discussion with influential members of the epistemic community.

These three features of the research undertaken in this study were thought of and used in close complementarity and to buttress each other. The underlying objective is the minimization of possible biases, through the use of a fresh and thorough approach to a complex multidimensional object of study like wild cards. For instance, our systematic literature survey showed an almost total absence of surveys on wild cards, and also of surveys in the field of foresight using bibliometric analysis. At the same time, it is common to find panels of experts associated with foresight exercises, but our survey could not find another example of the use of a group of specialists to discuss foresight and its concepts themselves.

The structure of this dissertation obeyed the following hierarchy of priorities: first, to provide a comprehensive contextualization of the field of foresight, its origins, evolution, schools of thought, techniques and *raison d'être*, as well as the role of the object of study, wild cards, within foresight; second, to analyse wild cards connections to other phenomena of change, particularly, looking into the potential role of weak signals as anticipatory tools regarding wild cards, and delve into the specificities of wild cards themselves; third, to integrate the results of the first two priorities with the empirical data collected from the quantitative and the qualitative analyses, consolidating a broader and clearer picture of the concept of wild cards.

The information collected on this study effectively allowed us to address the three research questions identified at the start:

- How is the concept of wild card currently perceived? How to define it?
- What is the role of wild cards within the large network of foresight concepts?
- What achievements? What progress already made and what is ahead?

It is still difficult to find a final and consensual definition of wild cards. The vast number of synonyms and related expressions, some of which with marked differences, like *black swans*, attests the vitality of the research on extreme sudden change events and explains the predominance of theoretical investigation. However, some core features seem constant and widely accepted: wild cards are unprecedented, improbable, high-impact events, with the potential to redefine future trajectories; they symbolize the uncontrollable change that in a fleeting moment can overturn everything and anything.

In a fast changing and evolving world the *unthinkable* will undoubtedly take place, even if a specific event has a small probability of happening. This realization is at once the motive and the importance of wild card analysis within foresight methodologies. Wild cards are interconnected with weak signals since the latter hold the potential for wild card anticipation, even if it demands a thorough process of data mining and sense-making in order to filter the *general noise*. While anticipating wild cards will not always be possible, the wider horizons and the increased preparedness and flexibility resulting from the shared discussion and acceptance of contingency strategies, allows a greater adaptability when facing the impact of unexpected change.

This field of work shows a resurged interest, mainly after the turning of the century. Growing uncertainty, following increasing turbulence and complexity on the global economy, paradoxically amplifies shocks and, simultaneously, the necessity for quick and assertive action. Foresight addresses this need. Wild card analysis is defended as both a way of expanding futures awareness provided by foresight and as a test of resilience of systems/organizations, but also of envisioned futures.

Still, much needs to be done, and is being done, in order to further clarify the notion of extreme change and of ways to address it.

In spite of the efforts regarding the methodological support of this study, some limitations were unavoidable. The scope of our study points to the need of a wider search in the future (including a closer scrutiny of contributions made in the form of books, possibly using tools such as Google Scholar and Google Books), in order to encompass all dimensions of the concept of the wild card, increased the heterogeneity of the sample. Some articles were more focused on foresight, organizational learning, weak signals or strategic management rather than specifically on wild cards. This had an effect on some analysis like the exam of the impact of articles and journals, in which

some outliers were identified, like the article of Robert M. Grant. An article with a great impact, but only marginally related with foresight.

Another shortcoming was the limited number of expert's answers gathered. Due to the clear importance of having the opportunity to discuss directly this matters with the people actively involved on its research, more answers would undoubtedly have diversified the range of insights collected. Also, other software tools could have provided new bibliometric indicators, enabling new findings, for instance an analysis of the authors and papers citing the articles included in the corpus, as a measure of the diffusion of the concept, possibly for other fields of research.

As for possible future avenues for research, some of the limitations could prove fruitful opportunities. For example, expanding the group of experts consulted could provide an interesting opportunity for asking how they see the role of foresight and of the sub-field of extreme change events in the future, in a foresight exercise regarding the field of foresight. Also, at a public policy level, the current global economic crisis shows the importance of wild card awareness and its potential role on long term policy definition.

This thesis sought to provide a broad but deeper than previously available look on the research on wild cards, within the wider research on foresight, and systematic appraisal of state of the art in this critically important area for strategy and policy in an increasingly volatile world.

7. References

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- <http://cordis.europa.eu/foresight/home.html>
- <http://www.foresight.gov.uk>
- <http://www.eforesee.info>
- <http://www.unido.org/doc/45321>
- <http://www.efmn.info>
- <http://www.futur.de>
- <http://millenium-project.org>
- <http://www.forlearn.jrc.es>
- <http://www.lga.gov.uk/lga/toolkit/index.htm>
- <http://www.gbn.org/>
- <http://gwforecast.gwu.edu/index.asp>

Appendix

Corpus results

| Date | Article | Autor | Country of affiliation | | | | | | | | | | | | | | Source | Vol/PP | Cited | Key aspects | Research Method | Target Group/Audience | Related expressions | | |
|------|---|--------------------|------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|--------|--------|---------------------|-----------------------|-----------------|--|---------------------|------------------------|---|
| | | | A | C | C | D | D | E | F | F | G | I | N | P | S | S | | | | | | | | S | T |
| 1981 | The use of scenarios in corporate planning-eight case histories | Klein, H.E. | | | | | | | | | | | | | | | | 1 | Long Range Planning | 14 (5) , pp. 69-77 | 6 | Utilization of scenario in corporate Planning | Theoretical | Research community | historyless situations; turbulent enviroment |
| | | Linneman, R.E. | | | | | | | | | | | | | | | | | | | | | | | |
| 1985 | The crucial epoch. Essential knowledge for living in a world in transformation | Laszlo, E. | | | | | | | | | | | | | | | | 1 | Futures | 17 (1) , pp. 2-23 | 0 | Manage perturbation changes and instability | Methodological | Research community | instability |
| 1988 | Organizational leadership of planned and unplanned change. A systems approach to organizational viability | Saxberg, B.O. | | | | | | | | | | | | | | | | 1 | Futures | (3) , pp. 252-265 | 0 | Management of crises and unplanned change by vigilance to the warning signs and by adaptive mechanisms in the organizations | Theoretical | Business Organizations | unanticipated events, unplanned change, surprise, warning signs |
| | | Knowles, H.P. | | | | | | | | | | | | | | | | | | | | | | | |
| 1988 | An analysis of the strategic responsiveness of firms | Trolle-Schultz, E. | | | | | 1 | | | | | | | | | | | | Technovation | 8 (1-3) , pp. 155-178 | 0 | Flexibility, adaptability and early signs awareness as ways to reduce uncertainty in the organization | Empirical | Business Organizations | turbulent enviroment, unforeseen events |
| | | Solgaard, H.S. | | | | 1 | | | | | | | | | | | | | | | | | | | |
| 1991 | Managing strategic issues in a turbulent environment | Camillus, J.C. | | | | | | | | | | | | | | | | 1 | Long Range Planning | 24 (2) , pp. 67-74 | 16 | | Theoretical | Research community | |
| | | Datta, D.K. | | | | | | | | | | | | | | | | | | | | | | | |
| 1992 | Scenarios for energy: Sustainable world vs global mercantilism | Kahane, A. | | | | | | | | | | | | | | | | 1 | Long Range Planning | 25 (4) , pp. 38-46 | 15 | Shell approach to strategic planning by the use of scenarios as a tool to help recognize weak signal of change in this case in the energy industry | Empirical | Research community | signals of change |

| | | | | | | | | | | | | | | | | | | | | | | | | | | |
|------|--|------------------|---|---|--|--|--|--|--|--|--|--|---|--|--|--|--|--|--|----------------------------|----------------------|----|--|-------------|------------------------|--|
| 2006 | Seeing the future in weak signals | Saul, P. | 1 | | | | | | | | | | | | | | | | | Journal of Futures Studies | 10 (3) , pp. 93-102 | 7 | Explores the reasons why leaders often fail to "see the writing on the wall" and invest in preparations for possible futures that weak signal analysis can alert them to | Theoretical | Govt agencies/Dep | |
| 2006 | Foresight-Are we looking in the right direction? | Neugarten, M.L. | | 1 | | | | | | | | | | | | | | | | Futures | 38 (8) , pp. 894-907 | 8 | How organizations can see, notice and attend better to their business and competitive environments | Theoretical | Research community | strategic surprise |
| 2007 | The external environment's effect on management and strategy: A complexity theory approach | Mason, R.B. | | | | | | | | | | | 1 | | | | | | | Management Decision | 45 (1) , pp. 10-28 | 15 | Influence of the external environment on the choice of strategic management activities. Identification of ways to handle uncertain environments | Theoretical | Business Organizations | turbulent environment |
| 2007 | Using Teams to Avoid Peripheral Blindness | Chia, R. | | | | | | | | | | | 1 | | | | | | | Long Range Planning | 40 (6) , pp. 559-573 | 6 | How teams may play crucial role in improving peripheral vision and awareness to identify threats and opportunities. How they employ specific practices, namely zooming, improvisation, bricolage, scenario thinking, wild cards and weak signals to sharpen peripheral vision and awareness. | Theoretical | Business Organizations | issues and events at the periphery of the organisation's awareness |
| | | Pina e Cunha, M. | | | | | | | | | | | 1 | | | | | | | | | | | | | |

| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|------|--|----------------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|---|-------------------------------------|--|------------------------------|--|---|--------------------|---|--|
| 2010 | Black swans and Knight's epistemological uncertainty: Are these concepts also underlying behavioral and post-Walrasian theory? | Davidson, P. | | | | | | | | | | | | | | | | | 1 | Journal of Post Keynesian Economics | 32 (4) , pp. 567-570 | 1 | Black swan approach, different uncertainty concepts and different policy implications. | Theoretical | Research community | rare events; uncertain events ; uncertainty | |
| 2010 | Keynes's uncertainty is not about white or black swans | Terzi, A. | | | | | | | | | | | | | | | | | | Journal of Post Keynesian Economics | 32 (4) , pp. 559-565 | 2 | "Black swan events" and Keynes's views of uncertainty | Theoretical | Research community | uncertainty | |
| 2011 | Fostering creativity and innovation for organizations in a turbulent environment for longterm survival | Samadi, S. | | | | | | | | | | | | | | | | | | 1 | APBITM 2011 - Proceedings 2011 IEEE International Summer Conference of Asia Pacific Business Innovation and Technology Management, | Art. no. 5996295 , pp. 71-74 | 0 | Monitoring the ability to identify, and master critical technological skills and technologies faced with a significant environmental complexity and turbulent business world. | Theoretical | Research community | turbulent environment |
| 2011 | Using Futures 2.0 to manage intractable futures: The case of weight loss | Pang, A.S.-K. | | | | | | | | | | | | | | | | | | 1 | Foresight | 13 (4) , pp. 35-45 | 0 | Futures analysis tools developed to help both individuals and organizations deal with futures and unexpected trends or wild cards | Theoretical | Research community | uncertainty |
| 2011 | The Big Picture - trends, drivers, wild cards, discontinuities and weak signals | Saritas, O. Smith, J.E. | | | | | | | | | | | | | | | | | | 1 | | 43 (3) , pp. 292-312 | 2 | Analysis of the shaping forces and sources of change and what might be their impacts, particularly where these may create entirely new challenges and opportunities | Theoretical | Research community | surprise situations; unforeseen developments |
| 2011 | Drowning in information - five ways of changing your information diet | Lindkvist, M. | | | | | | | | | | | | | | | | | | 1 | Strategic Direction | 27 (7) , pp. 3-4 | 0 | navigate the nowadays stream of noise and weak signals finding new business opportunities but also to create a portrait of the future that they can lead others toward | Theoretical | Business Organizations | ocean of information |

Letter to the international specialists

Dear Sir,

My name is Bruno Oliveira Silva and I am currently preparing a survey on wild cards as a Master's dissertation for ISCTE-Lisbon University Institute in Portugal, with the supervision of Professor Sandro Mendonça.

In my dissertation I mean to study **the evolution of the concept of wild cards**, identify related notions and main contributors to its theorization. It is also my objective to learn more about how/if weak signals scanning can be useful in the anticipation of wild cards.

Consequently, as part of this study I would like to gather some insights on wild cards from several world-class specialists, which is why I am contacting you.

Knowing that you must have a tight schedule, I would, nevertheless, ask if you could answer a few questions that would prove very useful for my work.

The questions would be the following:

1. When thinking about the future do you believe it is important to consider disruptive events, i.e. wild cards? Why?
2. Where and how would you define and identify this type of change?
3. Which techniques do you believe more suited to anticipate, and react to, wild cards?
4. When thinking about future wild cards do you expect more or less will happen in the next 5 years comparing with the last? Why?

I would like to stress that your participation in this study is highly appreciated and that I am, of course, at your disposal if any doubts arise.

Naturally, the results of my study will be available on request.

Yours sincerely,
Bruno Oliveira Silva

Following letter to the international specialists

Dear Sir,

Thank you very much for your answers and for your time, since I understand you are very busy.

Just as way of wrapping up, and inspired by your comments, I wonder if you could provide me with these further views:

5. What synonyms and other related expressions you think are suitable to refer to wild cards?
6. Could you send me a few examples of possible future wildcards?

Yours sincerely,
Bruno Oliveira Silva

Letter to the national (Portuguese) specialists

Exmo Doutor

O meu nome é Bruno Oliveira Silva e encontro-me a preparar um survey acerca de wild cards como dissertação de mestrado no ISCTE-IUL, em Portugal, sob orientação do professor Sandro Mendonça.

Pretendo estudar a evolução do conceito de wild cards, identificar noções relacionadas e principais autores na sua teorização. É também meu objectivo estudar se, e como, os weak signals podem ser úteis na antecipação de wild cards.

O meu contacto prende-se pelo objectivo de, como parte deste estudo, reunir algumas opiniões sobre wild cards de vários especialistas de renome internacional.

Sabendo de antemão os constrangimentos de agenda venho, no entanto, inquirir acerca da possibilidade de responder a algumas perguntas, de grande utilidade para o meu trabalho.

As perguntas seriam as seguintes:

1. Ao pensar sobre o futuro, considera importante incluir e reflectir sobre eventos-ruptura, ou seja, wild cards? Por quê?
2. Onde e como definiria e identificaria este tipo de mudança?
3. Que técnicas pensa serem mais adequadas para antecipar e reagir a wild cards?
4. Quando pensa em futuros wild cards, espera que nos próximos 5 anos venham a acontecer mais, ou menos, wild cards do que nos últimos 5 anos? Por quê?
5. Em que medida pensa que a prospectiva poderia contribuir para a competitividade das empresas nacionais?
6. A que razões atribui a fraca disseminação das técnicas prospectivas entre as empresas nacionais? Como inverteria esta situação?

Devido a limitações de tempo, gostaria de lhe pedir para enviar suas respostas até ao dia 20 de maio, para o e-mail: brunosilva@fsh.unl.pt.

Gostaria de salientar que a sua participação neste estudo é muito importante para o trabalho que me encontro a realizar e fico, claro, à sua disposição para esclarecer qualquer dúvida.

Naturalmente, se assim o desejar, poderei enviar os resultados do meu estudo.

Cordiais cumprimentos,

Bruno Oliveira Silva

Following letter to the national (Portuguese) specialists

Exmo Doutor

Muito obrigado pelas respostas e pelo seu tempo.

Só para finalizar, e sem querer tomar-lhe mais tempo, será que me poderia responder apenas a mais duas questões:

7- Que sinónimos e expressões relacionadas considera mais adequadas como referência a wild cards?

8- Quais as suas sugestões de potenciais exemplos de wild cards?

Obrigado pela ajuda e pela disponibilidade.

Cordiais cumprimentos,

Bruno Oliveira Silva

Answers of the International Specialists

| Name | Biography | Answers | | | | Synonyms | Examples |
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| | | Q1 | Q2 | Q3 | Q4 | | |
| Elina Hiltunen | <p>Founder of What's Next Consulting Oy and Executive in Residence (visiting professor) at Aalto University, School of Arts, Design and Architecture. Elina Hiltunen's Doctoral thesis focused Weak Signals in Organizational Futures Learning. This author also published several papers on the theme like "Was It a Wild Card or Just Our Blindness to Gradual Change?" and "Scenarios: Process and Outcome, Crowdsourcing the Future: The Foresight Process at Finpro.</p> | <p>Yes it is, because when a wild card hits these events are the things in which the true management competence is estimated. The management of the companies who will survive is of course better than those that cannot survive</p> | <p>I do not understand this question. Where? How you could identify is difficult. You cannot do that in advance, but you can be prepared for wild cards in advance by thinking that what are the most important things in your organizations and what would you do if you would lose them.</p> | <p>Looking at weak signals is good, and always thinking alternative futures that include also wild cards</p> | <p>Environmental disasters are wild cards, and they are expected to increase because of climate change: so yes.</p> | <p>You can check my ideas of wild cards here: http://www.jfs.tku.edu.tw/11-2/4wildcard-hiltunen.pdf</p> | <ul style="list-style-type: none"> • -cyber war • -natural catastrophe • -nuclear disaster • -meteorite • -war • -pandemia • -lottery win • -electric cut down • -riot <p>- you can also have wild cards in organizational level like: sudden death of key personnel, industrial spying, failure in product (like too much lead in paint of toys /fisher price), computernetwork collapse, major computer virus, sudden increase of product demand - you can also have wild cards in personal level: losing ones job, accident, disease, etc.</p> |

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| <p>Frank Ruff</p> | <p>With 17 years of practical experience in corporate foresight, applied industrial research and consulting, Frank Ruff is Senior Manager of Social Environment and Trend Research, a member of the Society and Technology Research Group of DaimlerChrysler in Berlin and Palo Alto (California).</p> | <p>Yes, it is important to consider disruptive events, because they frequently pose major risks (and sometimes opportunities) to any type of business activity, but sometimes also to the larger economy, society and politics. Despite that consented importance of wild cards, companies are rarely ready to take potential disruptive events seriously. This is due to the fact, that most companies aspire for growth and business success and thus the thinking about disruptive events "disturbs" the optimistic mind set that is part of growth strategies. Mentally it is difficult to spread untroubled beliefs about growth, success etc. and at the same time think seriously about "disruptive events".</p> | <p>We identify disruptive events and risks by brainstorming in mixed groups or just with the heuristic "Think the apparently impossible". Also we find vast lists of wild cards in the literature.</p> | <p>The wild card approach is well established within the scenario method (see our joint article with Sandro). Also in the context of our trend research we always include a step of analysis with the guiding question: "what alternative developments could happen" (trend reversal). Which driving forces could support this trend reversal?</p> | <p>The number of "wild cards" that happen in a defined period is a mix of (1) real major disruptive events or developments happening (2) a matter of perception/construction of these events or developments in society or in companies. One major disruptive event in the last five years is the financial crisis and the ensuing fiscal and economic imbalances. Because of counteractions (regulations of financial markets and institutions, fiscal pacts, deleveraging in credit-financed markets etc.) the likelihood that we will have a major financial crisis in the next 10 years is lower, but we will probably see some smaller aftermaths of this crisis for another 10-15 years. If we see our time in a more global and historical context, at least the advanced economies and societies of the OECD world are more resilient in my opinion than before. Think about the many "disruptive events" in Europe in the first half of the 20th century. I believe that problem-solving capacities of societies and economies have slightly improved over time. But this does not imply that we won't see further disruptive events. But they might be better managed, less severe in terms of consequences (e.g. Financial losses, unemployment, but no hunger or bereavement). If we mentally focus on "disruptive events" we will see more of them. Also our higher aspiration for "controlling events" contributes to the perception that there are more wild cards we have to cope with. On the other hand, the problem-solving capacities are growing. Both effects together lead me to the conclusion, that we will experience more or less the same level of disruptive events in the future.</p> | <p>Terms synonymous with "wild cards" are "disruptive events", "trend break", "trend reversal"</p> | <p>Listing examples for "disruptive events" without context does not make much sense and we do not have an aggregated list of wild cards. But to just name a few: -Strong oil price jumps -Global pandemic -Extremely restrictive regulation, e.g. on CO2 -Sudden fall of demand, e.g. because of economic recessions -Remote hacking of communication infrastructure</p> |
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| <p>Fred Phillips</p> | <p>Editor-in-chief of the journal <i>Technological Forecasting and Social Change</i> and author of the textbooks <i>Market-Oriented Technology Management</i> (Springer 2001), <i>The Conscious Manager: Zen for Decision Makers</i> (General Informatics 2003), and <i>The Technopolis Columns</i> (Palgrave 2006). Dr. Fred Phillips is Professor and Program Chair at the State University of New York and has been a consultant to such organizations as Intel and Texas Instruments.</p> | <p>At the simplest level, the answer is, "Of course." If there were no disruptive events, simple trend extrapolation would suffice to predict the future, either ad infinitum or until some saturation point is approached. I think it's important to specify whether you intend 'disruptive' to mean: a distressing event that makes it impossible to conduct "business as usual" and to follow "normal" procedures. (This is the usual colloquial usage of 'disruptive.')</p> <p>the formal definition Clayton Christensen uses, namely, a product that enters the most price-sensitive segment of the market and filters upward to displace more established and expensive products or, indeed, any innovation. Note that researchers who should know better have started to use 'disruptive technology' to indicate any technological substitution, whether of the Christensen variety or not. In my writing, I have defined innovation as a non-differentiable point in a learning curve. It may be a discontinuous point. Especially in the latter case, it's hard not to view an innovation as a disruption</p> | <p>Here is one of my papers from several years ago, which shows how to detect it in the manufacturing learning curve situation. It can also be done in services, if learning/experience curves are tracked or can be calculated from management accounting data.</p> | <p>This is much harder than identifying them after the fact, as in #2 above. I believe most wild cards will emerge from technology fusion. (Fusion is much more important than convergence, despite that more researchers are looking at convergence these days. The original reference for technology fusion is Kodama.) What organic chemist would have imagined, for example, that his work would be relevant to the manufacture of flat-screen displays (OLEDs)? Making these fusion connections depends on being aware of work outside one's narrow field. This in turn depends on having connections (personal or via reading) with such work. These connections can be analyzed by modern network theory, bibliometrics, etc.</p> | <p>Definitely more. The growth of online collaboration tools and team science means more connections (via 'weak ties') will be brought to every research project. The growth of overall complexity in our society (see attached editorial that will appear in <i>Technological Forecasting & Social Change</i>) generates epiphenomena that will be of wild-card nature.</p> | | |
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| <p>Harry Rothman</p> | <p>Harry Rothman is Editor-in-Chief at <i>Technology Analysis & Strategic Management</i>. Has worked in science and technology policy studies for over 40 years.</p> | <p>Yes. In boxing it's the punch that you don't see coming that knocks you out and it's the same in life generally... be prepared and on your guard.</p> | <p>I think they have certain characteristics: they are are: unlikely; but high impact; maybe outside the paradigm of conventional - especially establishment thought. They are the bad thoughts/news that you don't want to tell the boss (or yourself).</p> | <p>There are no sure-fire techniques. Recall the many variants of Murphys Law. "If something can go wrong it will", and its corollary "Murphy is an optimist."</p> <p>Always have some skeptics, non-conventional thinkers, outsiders to provide scenario inputs especially if they make you sick or angry... they might be right. Everybody said Marx was finished in 1990 but his ghost bit the orthodox freemarket economists' egos in 2008... and we still await the predicted recovery five years on.</p> <p>I think most forecasts go wrong because of weaknesses in their core ideological assumptions; it is a grave weakness to have no theoretical awareness of your ground, and the alternative theories and evolutionary/historical understanding with respect to your foundations.</p> <p>You need models which have change built-in. For example:non-linear models, catastrophe theory, chaos theory, cybernetic modelling - especially importance of Ashby's law of requisite variety, dialectical theory-quantitative change leading to qualitative change - unity and struggle of opposites - negation of the negation and so forth.</p> | <p>I think more disruption will happen. Because if we take the financial economic crisis affecting Europe and USA it still developing, and out of control... one recalls that 1929 and the thirties in Europe & American was not resolved without a world war, which enabled appropriate restructuring and temporary stability.</p> <p>At a political level the "Arab Spring" is not over it is still developing and could move further East bringing in Israel & Iran; or South destabilising Western & Southern Africa.</p> <p>How the changing and weakening relative power of the USA will affect their domestic politics is uncertain, as are the profound demographic ethnic changes that are occurring there. There are strong groups in USA who are being weakened politically, potentially driven from federal power within the present 2 party structure - the political map of America looks unstable to me, how will they respond?</p> <p>China & the Indian subcontinent appear fairly stable and I don't think they will break up, not whilst their economies are still growing - but their high Gini coefficients don't bode well and if they don't start falling then real social unrest will breakout.</p> <p>The environmental issues worry me, we have a lethal combination of scientific ignorance and vested interests and I would look for wild card events in this area.We still have to find resources for another 2-3 Billion people by 2050, assuming no catastrophic fall in population (think out possible ways this might occur?) The attempts to contain CO2 levels look to have failed.</p> <p>On technology, the communications revolution has not worked itself out yet... will it lead to greater potential for democratic freedom and opportunities to control governments or the reverse, perhaps in the name of protecting us against "terrorism"? Is it opening up a greater technological vulnerability. I expect some wild card events here.</p> | <p>Black swans, cascading discontinuous events (Marcus Barber) series interacting events rather than one off.</p> | <p>Here are a few wild cards.</p> <p>Political. Eurasian religious war Assassination US President Regional nuclear war Military defeat of Israel Collapse of EU after revolts in Mediterranean states</p> <p>Natural: Toba scale volcanic eruption Impact event on major city Lethal strain common airborne disease Sun storm crashes all GPS</p> <p>Technical Effective fusion power Human brain ageing reversible Brain transplant successful 3D printing universalised First successful human/nonhuman chimeras</p> |
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| <p>James Robins</p> | <p>Editor-in-chief of the journal <i>Long Range Planning</i>, is also an associate to the editorial boards of the <i>Strategic Management Journal</i> and <i>Global Strategy Journal</i>. James Robins' main areas of research are strategic management, corporate strategy, strategy theory, research methods, international ventures, knowledge transfer, and emerging economies firms. He is also a professor of Business Policy at the Vienna University of Economics and Business.</p> | <p>I think it is important to be aware of the possibility of disruptive, unexpected events - however, I am not entirely confident that much can be done to anticipate specific events. The sort of "normal accidents" that Perrow described are, unfortunately, normal. They are often caused by the unexpected intersection of unplanned behavior that creates a event thought to be unlikely. Human behavior lies at the bottom of most real "wild cards."</p> | <p>In many ways, my answer above addresses this question too. Identifying events like this after they happen usually is not difficult. We do not even become aware that they happened unless they have serious consequences. Anticipating them is deeply problematic because they are constructed by human behavior and random chance. Behavioral economics probably can help a little to narrow the range of wild card events, but the element of random collision among humans cannot be anticipated.</p> | <p>This is answered by the response to "2". The problem ultimately is sociological, but sociology (in which I firmly believe) has few tools for anything that specific. I do think unexpected market events could be less frequent if we had a better sociology of market behavior, however.</p> | <p>Almost certainly more. Social and economic systems have become increasingly complex and will continue to become even more complex. To use a crude metaphor, this is a little like heating molecules. Brownian motion increases, random collisions of behavior increase, and there are more bizarre events. One small illustration - about a week ago, the Associated Press twitter account was hacked and a false story about Barack Obama being injured was published. High velocity trading programs now scan news feeds on twitter using text recognition programs and automatically execute trades. The US market fell by 150 points in seconds and then recovered when the news flash was declared false. These types of vulnerabilities in human socio-technical systems and the possibility of deliberate or accidental manipulation have created a fertile field for disruptive, unanticipated events.</p> | | |
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| <p>Jennifer Cassingena Harper</p> | <p>Director of Policy within the Malta Council for Science and Technology. Jennifer Cassingena Harper lectures in foresight at the University of Malta's Masters Programme in Innovation and Creativity. Her research interests include International Level Foresight and STI Policy</p> | <p>Yes because they can have a profound influence the direction of trends and require last minute changes in planning. It is important to be prepared for sudden changes in plans and to have different contingencies so as not to be taken by surprise. In certain cases where the effects of disruptive events are expected to be devastating, this prior planning and preparedness can prove crucial.</p> | <p>These changes can take place potentially at any point in time, in any location and context. They can take the form of natural and man-made events and can relate to all aspects of human and ecological well-being.</p> | <p>Horizon scanning, scenarios, forecasting linked with the previous instruments</p> | <p>More wild card will emerge because the pace of technological change and the impacts on society and the ecology is growing incrementally.</p> | <p>Disruptors or ruptures</p> | <p>Weather controlled by humans Underwater cities Green noiseless transport.</p> |
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| <p>Karlheinz Steinmüller</p> | <p>A future researcher at the Sekretariat für Zukunftsforschung in Gelsenkirchen. Karlheinz Steinmüller also researches the use of science fiction for future studies. He has developed scenarios on biomedicine and on unexpected discontinuities (wild cards).</p> | <p>There are different reasons: - All really interesting things about the future are outside the scope of a linear extrapolation of the present state. Therefore you have to try to get an idea of changes that lead beyond this "prolonged present". Disruptive events in general and wild cards (low probability disruptive events) are one way to do this. - We all have out preconceptions, or limited perspectives, our prejudices. Thinking about wild cards is a way to overcome, hopefully, these limitations, at least partially. Wild cards may open your eyes. Or, to express it another way: Trends close the future, wild cards open it up. - The future consists of emergent developments, sudden, surprising emergence of new things. Wild cards are one way to come closer to these developments. - And last but not least: History tells us that there are phases of continuous, evolutionary change - and phases of turmoil, chaotic, disruptive change. For the first type of change, trends and extrapolations (and expert consensus) may be sufficient, for the second one has to rely on scenarios, wild cards, dissenting experts.</p> | <p>There is no perfect formula or methodology for that. You have to rely on serendipity: To open your eyes and to see and appreciate things you are not looking for. Of course, systematic questioning your premises, your conceptions about the future helps a little bit. And searching for weak signals (e. g. in a horizon framework) may also help (but interpretation is difficult). But: weak signals are found (they are news items); wild card (that did not yet happen) have to be invented. You need imagination for that.</p> | <p>This question refers to at least three different aspects: - anticipating wild cards, i. e. identifying them (really difficult intellectually, since you take refuge to imagination, and there is always a lack of imagination and at the same time a surplus of it), estimating their likeliness and their closeness (even more difficult since you have no standards, no benchmarks for that) - preparing for wild cards (difficult on the practical level, since nobody wants to invest effort in something that most probably may not arrive - among hundreds of equal contingencies) - reacting to them when they happen (even more difficult on the practical level, since most decision makers are surprised and react without plan, e.g. purely symbolic or outright counterproductive)</p> | <p>I have no reason to assume that the next five years are more prone to wild cards than the past five years. (We always live in a time of change, more or less chaotic change.)</p> | <p>As I define wild cards (events with low prob within the given time horizon, with high impact on the considered system, surprising to most people, rather without historical precedents) there is no exact synonym. Expressions like disruption (disruptive event) or rupture say nothing about probability. Black Swans as defined by Taleb could be seen as still unidentified wild cards or, alternatively, simply as surprising events. Of course, futurists tend to confuse terms and use them often in a their special ways - since there is not yet a agreed on terminology for foresight.</p> | <p>Break up of the United States Cold fusion really works (Some people would claim that it already works - but I regard this as highly improbable.) Shift of global manufacturing center back to Europe Chinese on the Moon before 2020 Lovelock's "morphogenetic field" proved to exist Male fertility suddenly declines all over the planet to near zero You can invent hundreds of wild cards by simply taking as true what freaks, conspiracy theory adherents, marginal scientists etc. claim. But it is not so easy to select the really interesting ones. (Pandemia is not, since everybody has it on the radar screen. And for a sufficiently long time horizon, it is no longer low-prob.)</p> |
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| <p>Riel Miller</p> | <p>One of the world's leading strategic foresight designers and practitioners. Head of Foresight for UNESCO in Paris and currently a board member of the Association of Professional Futurists; Fellow of the World Futures Studies Federation; Faculty Member in The Master of Public Affairs at Sciences-Po in Paris; and a member of the board of Strax, The Research Unit for Strategic Intelligence and Exploration of the Future at Aalto University in Finland.</p> | <p>A quick bottom line is that wildcards are a fairly small sub-set of what I call contingency futures – preparation for imaginable (usually already known and modelable) external events. This is a routine area of foresight – simulations and drills are effective ways to prepare. I'm sorry to be somewhat negative from the point of view of original contributions to research – but I regard this field as well-trodden.</p> | <p>Synonyms for wildcards - not too many come to mind. Mostly I see a wildcard as an event that is prepared for because it is low probability but high disruption. To prepare there is either the specific - a fire exit sign - or the general - teamwork and communication. There has been a lot of discussion of different kinds of wildcards on the Association of Professional Futurists listserve in 09. A bit since. Technically a blackswan is not a wildcard, but I think it is entering the lexicon</p> | <p>Round up the usual suspects... pandemics, climate change induced storms, rising sea level, financial instability, world war, etc. Maybe a bit more random violence, but perception is not reality in the sense that the proportions may be lower relative to other periods. Still people will worry... But there are plenty of books on this subject – scare mongering, etc.</p> |
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| <p>Ted Fuller</p> | <p>Ted Fuller is Editor-in-chief of the journal <i>Futures</i>; Head of the Business School in the University of Lincoln; Chair in COST A22 Foresight Methodology Project and Professor of Entrepreneurship and Strategic Foresight in the University of Teesside. He established two research centers at the University of Durham Business School (DUBS), one in Knowledge Systems and other in Foresight Research.</p> | <p>Testing resilience: systemic, agent and conceptual Broadening range of potential systemic factors</p> | <p>Normally after they have happened, and often quite some time after. Anticipating such changes requires one to elaborate the inter-dependencies of the 'system' or world-view and also to identify what such systems or world-views are 'open' to (as in open systems). This is actually an impossible task. However if taken at the level of 'what do people assume is possible' and then extending this perspective; one can challenge received wisdom and show that it is necessary to challenge this in the event of some disruptive change.</p> | <p>Anticipation and reaction are two completely different things. If you are talking about at a planning/scenario stage, rather than an actual event, then I would suggest that what is needed are multiple perspectives on the phenomenon under analysis. Such perspectives cannot come from the people who live their everyday lives within the field of study, as arguably their existing set of assumptions make re-conceptualisations quite difficult. How one goes about this depends on whether the purpose is to test resilience (in which case quite standard, so called 'wild cards' can be used (a simple description of a break in a long established pattern; such as economic growth for example). However, to identify 'surprises' rather than consider their effects is much more difficult. That is why they are called surprises. A process of challenge to norms produced from people with a different perspective might reveal unconsidered risks or threats. As far as 'reacting' is concerned. Let me assume first that you mean reacting in a planning process – 'what if'. Typically, contingencies are developed depending on the potential impact of the threat, along with a monitoring for signs of possible escalations. An alternative approach is the development of real options, which can be triggered in the event of a particular circumstance. If you mean how to react in the real event of a disruption; that of course is much harder because it is nearly always involves changing ones mental model or theory of how the particular world (the field that we are involved in) works, and having enough people share this new mental model. This is course part of the reason for undertaking foresight exercises; but seldom are they inclusive enough. Such times also offer great opportunity for reshaping normalities.</p> | <p>In general my view is that the World is increasingly complex. That complexity generates uncertainty because many individual decisions are made and the combinations of these are unpredictable. At the same time the complexity is further amplified by media (including social media) so we actually are more aware of disruptive or risky events. Thus our perception is that rates of change are increasing in uncertain ways</p> | <p>Unexpected: Unexpected event High Impact surprise Unknown power Effect outside normal limits Unconsidered possibility that happens Disruptive Symmetry breaking effect High power effect Resilience breaking (The original term for wild card actually means something different; in a pack of playing cards (Poker etc) a 'wild card' is one that can be given any value by its owner - Implying a high level of control and exactly the opposite to a 'Wild Card' in foresight. Of course, within the 'card game' the OTHER players don't know what value will be given to the card or when it will be drawn from the pack, and hence its synonymous connection to 'unknown')</p> | |
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Answers of the Portuguese Specialists

| Name | Biography | Answers | | | | | | Synonyms | Examples |
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| | | Q1 | Q2 | Q3 | Q4 | Q5 | Q6 | | |
| António Alvarenga | <p>Director do Departamento de Estratégias e Análise Económica da Agência Portuguesa do Ambiente (APA). António Alvarenga é responsável por vários cursos de prospectiva em programas de mestrado e seminários de formação de executivos no ISEG-IDEFE.</p> | <p>Todas as organizações, empresas, países, ..., devem pensar em wild cards porque poderão ter um impacto devastador. A sua baixa probabilidade não significa que não aconteçam, podendo mesmo colocar em causa a existência da organização. Trata-se assim de procurar perceber o que podem significar, para que não se seja destruído por estes eventos.</p> | <p>Como fontes de wild cards, estas não podem ser as tradicionais, isto é, relatórios da EU e da OCDE, ou muitas vezes mesmo da Academia, não fornecem informação nova neste âmbito, não são feitos pensando em wild cards. Devemos sim procura-los nas fringes, marginais, sem qualquer sentido pejorativo, apenas deve estar presente a preocupação de ir buscar informação junto de pessoas e organizações na vanguarda de várias áreas, que poderão encontrar mais facilmente, e caracterizar, wild cards.</p> | <p>Os wild cards são normalmente identificados através de Workshops ou painéis de peritos. É, contudo, importante que estes não incluam apenas especialistas numa área. Deverão sim alargar-se a participantes com conhecimentos mais generalistas, i.e. live evidence, pessoas com diferentes perspectivas e experiências que acrescentem à discussão. Mesmo num sector específico, como a indústria do software, poderão existir wild cards em áreas societais ou ambientais, a que os especialistas na área poderão não estar sensíveis, mas que poderão ter grande impacto sobre aquela indústria. Um wild card aparentemente longínquo pode ter um grande impacto num determinado</p> | <p>A tentação natural é dizer que irão acontecer mais wild cards porque o mundo se está a tornar mais complexo, turbulento e imprevisível. No entanto, quando se olha para o futuro existem outras forças de mudança que também têm de ser considerados como drivers, incertezas, tendências pesadas, sinais fracos, etc... Actualmente, alguns dos wild cards tradicionais vêm-se tornando incertezas e por isso até podem vir a existir menos wild cards. Por exemplo, uma crise fortíssima no Euro seria um wild card há 5 ou 10 anos, mas hoje a probabilidade de uma fragmentação do Euro aumentou muito e configura apenas uma incerteza. Em períodos de grande convulsão podem efectivamente</p> | <p>. Pode efectivamente contribuir. Todas as organizações devem ter uma visão do futuro. Algumas trabalham-no melhor, outras nem tanto. Existem algumas instituições portuguesas que têm o hábito e equipas que utilizam ferramentas prospectivas, outras procuram construir essa visão com base noutras técnicas fora do core da prospectiva, mas muitas fazem análise de tendências e análise sobre factores, procurando desenvolver uma visão estratégica, de forma a lidar com o futuro. Todos temos uma visão do futuro, mas existem processos e decisões que são particularmente importantes e aos quais devemos devotar particular atenção e cuidado, ao invés de decidir apenas com base numa visão "intuitiva" do futuro, isto é um conceito qualquer de futuro que pode ser muito frágil. A prospectiva permite não só robustecer a visão de futuro como também torna-la partilhada dentro da organização. Diferentes pessoas possuem pontos de vista sobre o futuro muitas vezes divergentes, e apenas</p> | <p>Esta questão pode explicar-se pelo modelo de desenvolvimento baseado em mão de obra barata característico de Portugal. Este modelo foi explorado com sucesso por empresas nacionais e europeias, que também aproveitavam outros recursos naturais do país, resultou, num determinado contexto. Alicerçando-se aqui a competitividade internacional, sobretudo com o acesso ao mercado europeu. No entanto, como resultou, quando se alteraram as características externas foi muito mais difícil mudar. Às vezes é difícil mudar o que não funciona, ainda é mais difícil mudar o que funcionou. Contudo este modelo já não era adaptado ao mundo globalizado e em enorme mudança tecnológica. Portugal deixou de conseguir competir, baseando-se nestes factores tradicionais. Estas fragilidades e dificuldade em enfrentar os mercados internacionais foram-se mantendo latentes, anestesiada pelo efeito limitador da tensão que derivou dos fundos estruturais e da manutenção de juros baixos durante um período alargado de tempo. Em 2007 estas fragilidades vieram ao de cima, libertando-se toda a pressão acumulada.</p> | <p>. Mindquakes, disrupções, descontinuidades. Black swan não é sinónimo, mas o conceito em si é muito próximo, da mesma família que wild card. A forma como é tratado por Nassim Taleb, a conclusão retirada, é diferente, muito mais radical. É muito interessante mas não é o pensamento decorrente dos wild cards. Existem duas respostas possíveis aos wild cards, uma mais tradicional e outra mais radical. Na postura tradicional, identificam-se os wild cards que nos podem afectar mais directamente e preparam-se planos de contingência, planos B. Isto é, tenta-se um posicionamento mais próximo e favorável face aos "bons" e a preparação face aos "maus", de modo a não se ser destruído. A estratégia e organização não é definida devido aos wild cards, esta é definida pelo que se considera mais provável e, por definição, os wild cards não são o mais provável. A visão de Nassim Taleb é a mais radical, segundo esta, a definição da estratégia tradicional é errada. A realidade não é feita de</p> | <p>Exemplos tradicionais de wild cards (para Portugal): Acidente nuclear em Espanha, fim do Euro, curas para doenças, energias sem custos, fim da União Europeia, guerra na Europa, ... Não são contudo os mais interessantes para o nível estratégico, decisional. O interesse de pensar em wild cards decorre de adequar o exercício ao nosso foco do problema em análise. Com base nesse foco, então sim poder-se-ão identificar possíveis wild cards e depois caracterizá-los bem, encontrar evidência que os mostre plausíveis, percebendo o seu potencial significado, e importância, para o problema-questão inicial. Os wild cards identificados devem estar bem agarrados ao foco, não tendo de estar</p> |

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| <p>António Alvarenga (cont)</p> | | | | <p>foco. Os participantes num painel deverão, ao mesmo tempo, deter informação que justifique porque determinado evento constitui um wild card, ou seja, o que lhe confere uma baixa probabilidade, normalmente abaixo de 5%, de probabilidade subjectiva percebida, e um potencial grande impacto, em determinado horizonte temporal.</p> | <p>aumentar o número de novos wild cards, mas, por outro lado, alguns dos tradicionais passaram a configurar-se como incertezas dado o grande acréscimo na sua probabilidade de ocorrência. Não é por isso possível dizer se aumentarão ou não os wild cards nos próximos 5 anos.</p> | <p>o facto de existir uma decisão estratégica não garante o alinhamento com esses objectivos. A discussão inerente à prospectiva permite reforçar a visão de futuro com a validação de vários argumentos e, desta forma, promover a partilha e identificação com a estratégia resultante. A cultura em Portugal acaba por não ser muito virada para o futuro, pelo que se sofreu muito com os impactos inesperados que se verificaram. A sensibilidade para esta questão aumentou, agora que “o futuro nos caiu em cima”. A entrada da China na OMC e a sua ascensão no panorama económico internacional, o alargamento da EU a leste, a crise do Euro, foram processos previsíveis, não wild cards, mas a maioria do tecido empresarial português não conseguiu posicionar-se. Os grandes grupos económicos portugueses foram a excepção, Sonae, Jerónimo Martins e PT foram alguns que conseguiram ver o futuro poderia trazer e adaptar-se. Os que não conseguiram enfrentaram todo o espectro do impacto.</p> | | <p>distribuições normais, é feita de black swans. O que interessa não é definir estratégias para as distribuições normais, mas sim delinear uma estratégia para aproveitar as consequências favoráveis dos black swans positivos e não ser destruída pelos negativos. São por isso duas, quase, teorias da estratégia face a eventos ruptura. Sendo o conceito de black swan e de wild card próximos, enquanto eventos-ruptura na margem do conhecimento.</p> | <p>próximos dele, podem estar distantes da área em questão, mas que são escolhidos pela sua especial relevância, e impacto, em relação ao foco, e não genéricos. Os wild cards identificados dependerão assim do foco, como o futuro da administração pública portuguesa, o futuro da mobilidade em Portugal, ou o futuro do automóvel. Por exemplo, sendo o foco o ambiente em Portugal, os wild cards poderiam ser: um derrame petrolífero, terramoto em Lisboa.</p> |
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| <p>José Luiz A. Silva</p> | <p>Membro da Direcção do IESE (Instituto de Estudos Sociais e Económicos). Especialista, entre outras áreas, em Prospectiva Estratégica.</p> | <p>Na terminologia da Escola Francesa da Prospectiva, trata-se dos "futuríveis" ou seja factos portadores de futuro, que são indícios ou sinais hoje quase indescritíveis e que no futuro podem constituir tendência pesadas. Acho que têm uma importância fundamental nos estudos sobre o futuro, qualquer que seja o tema, uma vez que podem ser eles os grandes responsáveis pelas rupturas nas tendências que são anotadas no diagnóstico.</p> | <p>Este tipo de mudança pode ocorrer em tudo o que possa imaginar e que tenha potencial para isso. Como estamos a falar de futuro, nada é impossível, apesar da possibilidade de ocorrerem é altamente incerta. Mas é por essa razão mesmo que se tornam importantes na análise e podem muitas vezes serem os factos definidores do futuro.</p> | <p>Para mim as técnicas para definir esses factos portadores de futuro, estão baseadas na observação crítica da realidade e na audição/pesquisa por um conjunto alargado de actores/peritos que possam pensar fora da caixa. Acho que numa pesquisa sobre esses wild cards, é muito importante o clima que se vive nos grupos de análise ou nos ateliers de prospectiva, uma vez que está impedida qualquer género de censura ao que cada participante diz.</p> | <p>É difícil dizer com propriedade, mas tal como a incerteza é cada vez maior, uma vez que temos a noção sempre que cada vez mais o ritmo das transformações é mais rápido e profundo (aliás uma sensação que tem ocorrido sempre desde a antiguidade), daí que pense que sim, que nos próximos 5 anos vão emergir mais wild cards, assim como nos períodos seguintes provavelmente surgirão mais e assim sucessivamente. Com a emergência de mais actores/protagonistas a dose de incerteza crescerá sempre mais.</p> | <p>Por ser uma evidência total, custa a justificar. Mas perante a incerteza, torna-se mais importante conhecer o futuro. Há várias afirmações de prospectivistas célebres que confirmam esta afirmação. Como por exemplo diz Roland Berger, quanto mais rápido se conduz um automóvel mais longe os faróis devem iluminar, para antecipar os riscos que podem surgir. Ou "quanto mais uma árvore demora a crescer, menos se deve esperar para a plantar" (Gaston Berger)</p> | <p>Os portugueses são tipicamente do desenrasca e gostam de decidir no dia a dia. A prospectiva ou a reflexão obrigam a trabalho suplementar que não tem efeitos imediatos. Mas também se pode dizer assim: "A antecipação não está muito disseminada entre os dirigentes, pois quando tudo vai bem podem passar sem ela e quando tudo vai mal, já é demasiadamente tarde para ver mais longe que a ponta do nariz: é necessário reagir e depressa." Acho que esta situação resulta de uma cultura antiga adquirida pelo povo, que é partilhada pelas suas lideranças, e só lenta e longamente se conseguem alterar estes comportamentos. Repare que o próprio governo extingui nos últimos anos o principal e mais importante organismo de pensamento prospectivo e estratégico (DPP – Departamento de Prospectiva e Planeamento) sem qualquer clamor público. As empresas portuguesas são as menos sensíveis, apesar de poder haver excepções. Esta minha atitude de descrença baseia-se no estudo que fiz sobre a Prospectiva em Portugal no âmbito da minha dissertação de doutoramento e que comprova perfeitamente este raciocínio. Não vê como os governantes utilizam o estudo do FMI sobre o país? Que melhor exemplo...</p> | | |
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