

WILD CARDS

by

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I. HISTORY OF THE METHOD

Futures studies have experienced remarkable developments in the last few decades. They have departed from the planning optimism which characterized their earlier days and from far-reaching forecasts of the future. More than thirty years ago, Herman Kahn sought to describe the coming two hundred years; by contrast, futures research today seeks to identify more pragmatically feasible roads to alternative futures. However, one of the main post-Kahnian insights of futures studies is that the future frequently comes in the form of surprises. Chaos theory provided an easy to hand explanation.

In the late 1960s Corporate Planning at Shell started to apply scenario planning to the future oil markets. Pierre Wack at Royal Dutch Shell described Wild Cards as the “rapids” which businesses are facing (comp. Wack, 1985). Since then, this kind of “rapids” has been sometimes applied in scenario studies; occasionally terms like “disruptions” or “ruptures” (also in French) were used, but no specific methodology was developed. One first step towards such a methodology was a joint publication of the CIFS (Copenhagen Institute for Futures Studies), BIPE Conseil (Issy-les-Moulineaux) and the Institute for the Future (Menlo Park, California) in 1992 (BIPE *et al.* 1992), where these institutes suggested a definition for Wild Cards: “A Wild Card is a future development or event with a relatively low probability of occurrence but a likely high impact on the conduct of business”, (BIPE *et al.* 1992 p. v) and established a first catalogue of Wild Cards with indications about possible implications and how companies could react. However, no details about the approach were given.

In practical, methodological terms, when John Petersen looked for an approach to study surprises in 1995, he found that there was no literature on processes’ views of Wild Cards and how to deal with them. All practical methodologies relating to explicating alternative futures were associated primarily with manipulating trends and crosscuts. Having written a book on trends, *The Road to 2015: Profiles of the Future*, Petersen decided to tackle the gap and publish a small volume on how to think about surprises. His book *Out of the Blue: How to Anticipate Big Future Surprises* (first published in 1996; second edition 1999) contains a comprehensive Wild Card methodology that is used as the basis for this paper.

Events like the dotcom crisis, 9/11, and recently the financial markets’ meltdown underlined the relevance of Wild Cards, and not only to futurists. Even before the financial crisis, there has been a growing awareness of the fragility of the globalized world: As the world becomes increasingly integrated, the area that a single Wild Card can impact increases; it is clear that the study of Wild Cards, as well as possible preparation for and prevention of them – or even deliberately provoking wild cards! - is becoming more important with the passing of time.

In Germany, A. and K. Steinmüller followed Petersen’s approach and published their own Wild Card methodology cum catalogue in 2003 (Steinmüller 2003). Only recently, Wild Cards gained more attention from researchers engaged in strategic management or corporate foresight. Several papers treat the distinction between Wild Cards and Weak Signals (Mendonça *et al.* 2004, Hiltunen 2006, Steinmüller 2007) or the distinction between gradual change that suddenly dawns on us as a massive shift and discontinuities which are sudden surprises (Hiltunen 2006). Others

study the role of discontinuities in scenario development (van Notten *et al.* 2005). Increasing risk perception stimulates work on and with Wild Cards. It partly builds on the long tradition of research in the fields of risk assessment and risk management (see e. g. Klinke/Renn 1999, Harremoës *et al.* 2001). Some work on Wild Cards is done by (or for) reinsurance companies, see e. g. Müller (2007). Public authorities are sponsoring research related to Wild Cards – like the Government of Singapore (Nghoh/Boon 2008) or the European Commission (project iKnow: www.iknowfutures.com). Wild Cards have become an important topic for car makers and the aircraft industry (Mendonça *et al.* 2008). The Internet is increasingly used as a means of collecting, debating, and assessing Wild Cards and as an instrument to monitor Weak Signals that indicate the approach of a Wild Card.

II. DESCRIPTION OF THE METHOD

Most approaches in foresight relate in some way to one or more of three major factors:

1. **Trends:** driving forces that provide fundamental direction to the future
2. **Cross-impacts:** trends interacting with each other
3. **Wild Cards:** low-likelihood, high-impact surprises

Almost all methodologies focus on trends and crosscutting relationships; surprises are at best treated as something additional. It may be argued that the inclusion of Wild Cards in foresight is now even more relevant than before.

Why is a Wild Card methodology important? We live in a foreshortened span of time, during which we and our environment will change more than during any era in history. Humanity has never experienced the convergence...in some cases, the collision...of global forces such as those we may anticipate. Understandably, we have extraordinary difficulty imagining the scope of the events which are so rapidly coming at us. As the forces merge, recombine, and crash into each other, they cause successive second- and third-order events, out of the blue. When that happens, the whole interlinked complex catches us, and sends individuals, communities, corporations, nations, and international bodies, off balance. Part of the problem is that the developed world's support systems are constantly being reinvented to meet the burgeoning reality of the information age. Yet the very expansion of technological growth means the possibility of information overload and situations where it will be harder to comprehend, much less respond to baffling events. Big changes are occurring in the areas of population expansion, our social values, science, technology, and our physical environment. All these forces begin now to converge at an accelerating rate. These converging forces produce large events with very little notice; these low-likelihood, high-impact events can be characterized as Wild Cards.

Extraordinary Implications: The study of Wild Cards is particularly important now because the extraordinary growing technological capability of humans has produced, starting a few decades ago, new classes of Wild Cards. For the first time, Wild Cards have global implications. In some cases scientists believe they could potentially threaten the whole human race. Before the era of Wild Cards with global implications, human activity at worst spoiled a localized piece of real estate; examples of this phenomenon are Saddam Hussein's torching of the Kuwaiti oil

wells, huge strip mines, and the defoliating of the Vietnamese jungles. Now direct and indirect methods are in place of such a scale that the whole planet is threatened. A large nuclear war is a familiar but nonetheless ominous threat. Other Too-Big Wild Cards that are already looming are possible impacts of rapid change in the planet's climate, e. g. an interruption of the Gulf Stream. A potential asteroid strike would also, of course, be of this scale.

Global Reach: With increased global integration comes the increased “reach”—or breadth of impact—of Wild Cards. Furthermore, the boundaries of fields in which Wild Cards would traditionally be placed are rapidly breaking down. As a result, diseases become matters of national security and weapons utilized by national militaries, organizations, or individuals become matters of public health, with effects that span generations. Wild Cards have become more far-reaching than ever before.

Scope in time: In addition to having a wider impact in space, Wild Cards, called “futurequakes” by Steinmüller, exert a direct effect on the future – a ‘habitat’ of our hopes, fears, wishes, plans, and expectations. By producing changes in this ‘habitat’, they shake the entire landscape of the future reality.

The effect of these shocks is tremendous because they undermine our perception of the ordinary events. As new words with new meaning appear: – superterrorism, climate protection, glocalisation, – we change our frames of reference, our ‘mental map’ of the world. So Wild Cards not only transform reality but also revolutionize the future and rewrite the past. We look from a different perspective at past developments. Did they give rise to the Wild Card? Which “weak signals” did we miss?

Characteristics: A Wild Card has a direct effect on the human condition. It is large and has broad, important, and sometimes fundamental implications. A Wild Card moves so fast that there is not enough warning to allow the rest of the system to adjust to the shock.

Effects on the human condition: Wild Cards are significant because they affect important parts of the systems that define humans, our attitudes, and how we live. The links that affect us the most directly always get our greatest attention. Some parts of human systems are ranked higher than others—or, at least, a shock to them produces more acute responses. So, we must catalog those factors that seem to make the most difference to humans.

The target group: The impact of a big event varies dramatically from person to person, depending on how “close to home” it strikes. When deciding which Wild Cards are most important, the assessor must decide how much of an impact a particular Wild Card might have on his, her or its selected target audience. For example, politicians will presumably see the world in a different way from scientists. One might think of a group in psychological terms: is it inner-directed, outer-directed, or sustenance-driven? In any case, it is important for the assessor to know his or, or its audience and to address the perspective of the member(s).

Wild Cards can originate from quite different sources: unintended consequences of human action (political processes, scientific breakthroughs, risks of innovations...) or unknown processes in nature (possible tipping points in ecosystems, near-Earth objects...). Generally, they can be

systematized according to their origin e. g. along STEEP sectors (society, technology, economy, environment, politics). From an epistemological point of view it is useful to distinguish three types of surprises:

1. events that are known and relatively certain to occur but without any certainty as to timing (type of “the next earthquake”);
2. future events that are unknown to the general public (or even the researchers) but that could be discovered if we only consulted the right experts or if we had adequate models (type of “impacts of climate change”);
3. intrinsically unknowable future events that no expert has in mind, where we lack concepts and means of observation (type of “unknown unknowns”)

The number of Wild Cards – at least in the third category – is essentially infinite.

In order to systematize these diverse events and begin the investigation of Wild Cards, the assessing individual or organization must ask him, her, or itself **four key questions**:

1. What Wild Cards can in principle happen? (identification)
2. Which are the most important Wild Cards? (assessment / filtering)
3. Can we anticipate their arrival? (monitoring)
4. Is there anything we can do about them? (options for action)

These questions form the basis for the Wild Card methodology.

III. How to Do It

1. Identification: What Wild Cards can in principle happen?

Identification of Wild Cards seems an easy exercise, but the problem is to not end up with the “usual suspects” of intellectually not very challenging catastrophes and disasters. One can draw upon published lists of Wild Cards. Petersen (1997) describes 78 Wild Cards in his catalogue (see Appendix); 55 Wild Cards are portrayed by Steinmüller (2003). However, in most cases it is more appropriate to collect – or invent! – Wild Cards specific to the given foresight task. There are different ways to do this, in particular:

- Brainstormings
Given the right creative atmosphere, group processes result usually in a multitude of Wild Cards. You should be careful not to concentrate only on “bad” Wild Cards (“What is the worst which could happen to us?”) but also ask for “positive”, beneficial ones.
- Expert interviews
You can interview people about what they think are potential Wild Cards or engage them in a debate about surprises.
- Surveys
Experience shows that surveys (in particular Web-based surveys) are a good means to collect a large amount of Wild Cards. One can either use open questions or start with “seed ideas” as examples.

- Historical analogies
One approach is to look at similar situations in the past, determine which of the events were Wild Cards at that time, and construct analogies for the present situation.
- Science fiction
Since science fiction frequently tries to deviate from conventional thinking, it contains a lot of Wild Card ideas. One can also use the sequence of events described in science fiction narratives to construct post-Wild Card scenarios.

2. Assessment: Which are the most important Wild Cards for me or my organization?

Identification results in a large portfolio of Wild Cards; we need therefore some method of narrowing down the range of surprises that must be considered. One of the best ways to do this is to quantify the relative impact that a particular Wild Card might have on the assessor's target group. Because each Wild Card is complex with so many defining variables involved, we need a simple process of elimination. We can then compare the impact of the event to others that may occur. Although this process is relative, the conclusions are valuable nonetheless, for biases will be consistent across the spectrum of all considered Wild Cards.

The human factors: In order to consider the effect that a Wild Card might have on a person or group, the assessor will use a hierarchy of factors. The factors are divided into four major categories. The most fundamental of the factors that influence who we are and what we do are those that are associated with being:

- Our perception of *reality*
- Strongly held personal *values*
- Our health or *wellness*
- The *physical environment* in which we live

Our sustenance comes from a number of factors:

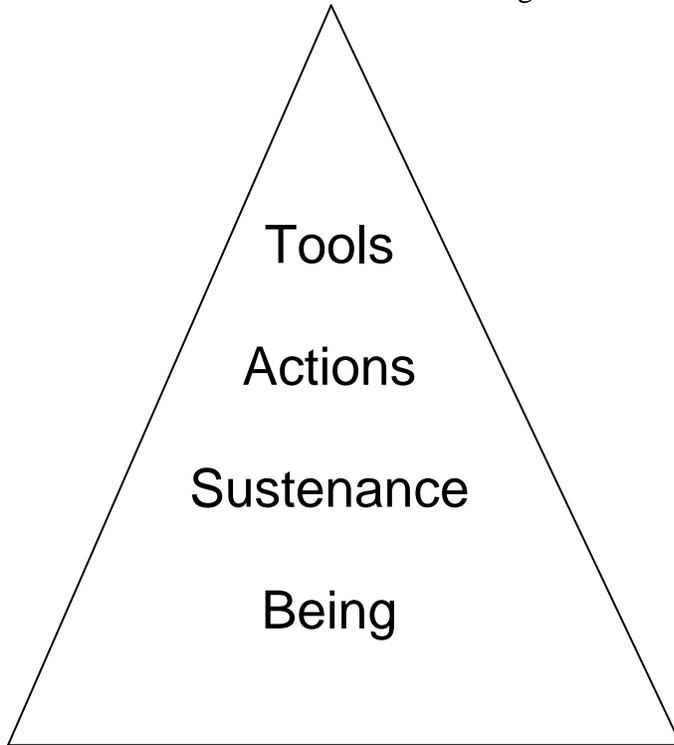
- The location or *habitat* in which we live
- The availability and quality of *food* and *water*
- The availability of *energy*
- How we *transport* ourselves from one location to another

There are a group of factors that describe what we do, or our actions:

- The way we relate to other individuals—our *personal relations*
- Our *formal group relations*—organizations, governments, etc.
- What we do with most of our time—*our work and recreation*

Then there is that cluster of tools or enablers, which we use to make our lives easier and more meaningful:

- how we *communicate*
- how we *learn*
- how we make and distribute things—our *technology*



We might see that the lower characteristics (being, sustenance) are intrinsically more powerful in terms of the way they influence behavior. Changes in upper issues (actions, tools), though important, are less profound in the breadth of their influence. The lower and upper issues play a significant role in the equation for determining the impact of a Wild Card. For that equation, we have assigned relative weights to the four groups of characteristics. The closer they are to defining the essence of a person (and the lower they are in the above triangle), the larger the impact score (from 1 to 4). This is called the power factor to represent the relative power of a Wild Card.

Impact factors: The Formula for Wild Cards

We will use three major characteristics—impact on human systems, implications, and high rates of change—in a simple relationship that yields relative impact.

Human systems:

- Vulnerability (V): How vulnerable is the system or person to the changes wrought by the event? A vulnerable system has difficulty bouncing back quickly after a hit. A resilient system can adapt easily to change.
- Timing (T): Does the Wild Card happen sooner rather than later? We assume that humanity gains depths and the ability to deal with shocks the longer we are around. Maturity comes with experience. One would hope that, ten years from now, we should be

able to handle challenges better than we can today. On the other hand, there are a few events that might be worse the later they happen.

An example might be the collapse of the Internet; as more time passes, more and more people and organizations will be dependent on the Internet for economic survival, making a collapse all the more catastrophic today than in 1996.

- **Opposition (Op):** Are there people or groups who will oppose these changes? The degree to which individuals or groups resist the event will make a difference in how quickly the event affects a person or group. If there are identified groups who fight hard against the change(s), the chaos (and length of the transition period) may increase.
- **Power Factor (P):** At what level does the event affect individuals? The closer an event is to defining the essence of a person, the larger the power impact score.

Large, profound implications:

- **Reach (R):** How broad is its effect? Is the event local, national, or global in extent?
- **Outcome (O):** How unpredictable is the outcome? Response to an event is affected by people's perception of the likely outcome. The greater the uncertainty, the more likely that people will respond in chaotic and ineffective ways.
- **Rate of change (ΔC):** Wild Cards come *fast*. They require such a large scale of response that the parts of the system that would usually deal with them can't. They don't have the time or the resources to respond effectively. The "surprise factor" might be due to the fact that the event was not anticipated and had no apparent early indicators. Or it might be too big—there perhaps was some warning, but the event was so large, and the inertia of the underlying system so great, that it was impossible to adapt and cope quickly enough.
- **Impact Factor (I_{AI}):** The Arlington Impact Index is a sum of the impact factors of the rate of change, reach, vulnerability, outcome, timing, opposition, and power factor of a Wild Card. In symbolic terms,

$$\Delta C + R + V + O + T + Op + P = I_{AI}$$

It should be noticed that the outcome of a Wild Card can be seen as positive, negative, or, in some cases, both. This is addressed in an additional Quality Factor. For example, advances in virtual reality and holography sound very positive, but imagine the implications if your personal image was manipulated to say things you'd never said or appear in places you'd never actually been. The value of the quality variable gives the prediction of the net effect of each (note that this is not derived directly from the Arlington Index).

3. Monitoring: Can we anticipate their arrival?

Obviously, Wild Cards of the third category (the "unknown unknowns") escape from any kind of observation or monitoring. But as soon as we have a Wild Card "on our radar screen", we may find precursor events that make the Wild Card more probable (or even inevitable) or indicators that hint at a rising probability – the upcoming Wild Card. Precursor events or the fact that an indicator surpasses a certain threshold may be interpreted as Weak Signals for the Wild Card.

Therefore, monitoring does not refer to the Wild Card itself but to the Weak Signals announcing its arrival.

It is not easy to establish an early warning system to track the emergence and evolution of these early indicators, but it is becoming increasingly possible to do so. New technologies, usually Web-based, are currently being developed specifically to identify Weak Signals that point toward any of a number of possible big, fast-moving events that could have significant impact if not anticipated. Prediction Markets is a point in case.

From the perspective of monitoring, we can add another factor to the assessment described above: the Foresight Factor. This factor reflects the theoretical possibility of anticipating the event. We know, for instance, that technology is now available that permits the prediction of earthquakes to a high degree of accuracy (in terms of their time, location, and intensity). We would therefore give a high foresight factor to an earthquake-based Wild Card. More generally, the Foresight Factor depends on the number, quality and reliability of sources (for indicators, Weak signals). However it should be noticed, that the methods of anticipation may not be well-known or understood, or these events would never be considered surprises. – In other words: The aim of monitoring is to deprive a Wild Card of its surprise status, i.e. to “tame” the Wild Card.

4. Options for Action: Is there anything we can do about them?

Dealing with Wild Cards requires innovative, unconventional methods.

Nonlinear and “out-of-the-box” thinking

- Systems thinking
- Creativity training
- Intuition
- Associative thinking
- Dreamwork

All are technologies for shaking up old assumptions and allowing new ideas to emerge



Information resulting from the use of these methods yields a new and improved understanding of potential surprises. This understanding results in plans of action to deal with the problem. This understanding can

- Help diffuse the Wild Card before it erupts (or help provoke it if it promises to be beneficial)
- Help mitigate and alleviate negative impacts of a Wild Card

- Give one a head start on adjusting for the changes that a Wild Card may bring

We learn from thinking about these events. We figure out how they work, and we put in place the necessary means to ameliorate them. But it is important to understand that most of these answers and indicators will not be found in the usual places; therefore, we must explore new and different frontiers in order to find them.

A systematic, open-minded approach to Wild Cards will revolve around at least three basic rules.

- Rule I: If you don't think about Wild Cards before they happen, all of the value in thinking about them is lost.
 - If one accepts that there will be an increasing number of Wild Cards in the future, then the only defense is to begin to systematically think about them *now*. The more that is known about a potential future event, the less threatening it becomes; this is because the solutions to it eventually become obvious.
- Rule II: Accessing and understanding information is key.
 - Whether identifying early warning signs of a Wild Card, understanding its structure, or developing a response, a sophisticated, effective information gathering and analysis process is needed. This process requires input from experts in systems behavior, the Internet, complexity theory, and other “new sciences”, as well as from many traditional disciplines. Access to a robust network of resources is necessary. Constant outreach through conferences, conventions, and other professional meetings provides links to other individuals and ideas that would otherwise escape one's point of view.
- Rule III: Extraordinary events may require extraordinary approaches.
 - Some of these potential events look so big, strange, and scary because typical methods of problem solving are incongruent with events of this magnitude and character. If we are to deal with them before they occur, we will need a new mindset that will allow us to look at potential problems in a new light.
 - Often, the most commonly used tools—including political, economic, and military approaches—will not be equal to the task.
 - This era of global transition will result in the redesign of the fundamentals of human activity. People and organizations that look for ways to deal with unprecedented events will be better prepared to survive and prosper. Those who are willing to unleash themselves from the past, take risks, and objectively search for novel tools and perspectives will come out ahead.
 - Many of the solutions we seek will come from unconventional sources that are outside of the mainstream.
 - It will require good judgment to identify the potential jewels within the unconventional sources that are being used. The “fringe” is typically the domain of more than the usual number of charlatans and misguided individuals, but the discoveries are worth the explanations. History has shown that significant breakthroughs, from those of Copernicus to those of Einstein, initially seem strange and somewhat unbelievable.

If we are to respond effectively to certain Wild Cards, we will also have to redefine basic concepts such as: self-interest, national security, standard of living, work, etc. We will almost certainly have to reinvent all or most of our educational system, government, economy, families, and military.

An institutional process for dealing with Wild Cards:

Serious engagement of Wild Card-level events requires a comprehensive and sophisticated process. Following is a methodology for identifying, analyzing, and tracking these events. It puts in place a structured system of early-warning sensors that search for indicators of important events. It establishes an effective method of displaying information from all sources in such a way that trends and relationships—and even the likelihood of actualization—become obvious.

1. Identify high-interest Wild Cards and segment them according to options:
 - Those that *must* be addressed
 - Those that can or should be addressed
 - Those events that can only be prepared for, not averted (usually revolve around individual natural events—those things for which humans are not the direct cause)
 - Those events for which there are likely to be no warnings
 - Those events that are potentially too big for the system to adjust to
 - Those events that might be changed
 - Those for which a new solution must be invented
 - Those for which existing tools (education, stockpiling, etc.) can be used
2. Determine what kinds of lesser events would point to the coming of a Wild Card.
3. Put in place a dedicated scouting group that looks for early indicators (traveling, probing, reaching).
4. Ensure that all organizational units are aware of general concerns and interests:
 - Make the whole system an information-gathering device.
 - Have a central clearing house where all of the information is received (probably electronically, perhaps a Web site).
5. Structure incoming information: early indicators, linkages, new events, unknowns, and confirmations.
6. Develop an ability to display information spatially in sophisticated ways that quickly suggest what might be happening. Show systems, relationships, early indicators, and potential effects.
7. Understand the high-interest Wild Cards and decide what can or must be done about them.
8. Create an action plan to influence those selected potential events that can be influenced.
9. Set gates or trip wires that generate increased attention to a particular event, as it appears more likely.

IV. STRENGTHS AND WEAKNESSES

Strengths: This method provides an approach to overcoming blind spots in our perception of the future. It focuses on possibilities, usually forgotten or underrated, on “wild” and strange ideas, which nevertheless have the potential to occur and to determine the future shape of things. It helps to survey the whole horizon, to question one’s own mindset, and to understand dramatic change. It addresses ruptures and discontinuities that go far beyond gradual change. In this respect it can counterbalance certain shortcomings of trend-driven foresight.

Weaknesses: In a way, the advantages of Wild Card methodology are also its drawbacks. Most Wild Cards seem to be – at least at first glance – far-fetched, implausible or even utterly impossible. Sometimes much effort is needed to convince people that it is nevertheless (or more exactly: therefore) even more valuable to consider them. Another difficulty arrives when one draws conclusions and tries to implement them. These conclusions are often counterintuitive or in contradiction to well-established convictions or to lines of action already firmly established. Therefore, barriers of acceptance may be high. Wild Card approaches may not fit very well into the organizational environment of a company or administration.

Some problems stem from the vagueness of the concept of Wild Card itself. There is still no generally agreed-on definition, and the definitions given are rather broad and not unambiguous. What means “sudden event”? What means “surprising”? This can lead to discussions – mostly not very helpful ones –, whether an item in question is really a Wild Card or not. Often Wild Cards are mixed up with Weak Signals or visions. More clarity is needed.

Further on, this method does not lend itself to monitoring for the actual occurrence of Wild Cards. There is a significant amount of work to be done after the method is applied. It includes the use of dedicated technology to monitor for early indicators of Wild Cards as well as sound analysis to attempt to determine the factors that contributed to the occurrence of the Wild Cards in question. The method may also produce a large amount of very heterogeneous Wild Cards that require varying methods of monitoring and analysis. The method provides a sound start for an assessor, but the only way to manage and monitor Wild Cards is with technology.

V. USE WITH OTHER METHODS

Wild Cards are quite effective when used with scenario-building. Scenario-building allows the assessor to see the smaller factors that might lead to a Wild Card event. Furthermore, combined Wild Card-scenario analysis allows the assessor to plan for the impact of a Wild Card depending on whether it is positive, negative, or could go either way. If the Wild Card is positive, steps could be taken to make it occur more quickly. If the Wild Card is negative, steps could be taken to attempt to stop it from happening or, if it is unavoidable, to minimize its effects. If the Wild Card could be either positive or negative, steps could be taken to maximize the probability of the occurrence of its positive aspects and to minimize the probability of the occurrence of its negative aspects.

Another consequence of combining Wild Card and scenario building is an ability to test our strategy and/or enhance a scenario development process (Wack 1985).

- Wild Cards can be used in order to estimate the susceptibility of a scenario to external disruptions.
- They can be used to compensate for potential weak points in the conceptual framework (mental map).
- They can help recognize new alternatives and be open-minded about the ‘unexpected’.
- Finally, they can be used to fight such common weaknesses as lack of imaginative capacity, wishful thinking or fixation on catastrophic scenarios (“hyper worst case thinking”).

What are the criteria for selecting a suitable combination of Wild Cards to use in scenario development? There is no all-embracing answer to this question. However, we may stipulate some general rules (Steinmüller 1997).

- Wild Cards have to be appropriate to the situation. Although they do not have to stem from the central area of the study they should be associated with it.
- Wild Cards should be as original and as new as possible. Their consequences should not be immediately apparent.
- Wild Cards that are “barely possible” according to conventional thinking should be used more.
- The analysis should not be limited to only two or three Wild Cards.
- “Negative” Wild Cards that undermine the constructed scenario should be considered first. They are usually a good test of the stability of the scenario.
- Wild Cards with a strong contextual reference to the scenario should be combined with Wild Cards that primarily change peripheral conditions and environment of the scenario.

In order to avoid potential prejudices, it may be useful – especially when identifying Wild Cards – to incorporate outside expertise into the study, either through interviews or a workshop.

Wild Cards are also used in modeling, where the Wild Cards take the role of exogenous excitation and are introduced periodically or at random times. Such a kind of sensitivity analysis has been done e. g. in the project ALARM (**A**ssessing **l**arge scale environmental **r**isks for biodiversity with tested **m**ethods) of the 6th EU Framework Program. In this project, quantitative impacts of extreme shocks in energy price levels, of contagious natural epidemics and of European cooling under thermohaline collapse of the North Atlantic were considered.

VI. FRONTIERS

In the past several years, specifically, after 9/11, the need to anticipate future surprises was realized on a larger scale than it had been in the past. From biohazard masks in the U.S. Senate to emergency preparedness signs (in case of a terrorist attack) in college dorms, the United States and the rest of the global community are beginning to more rapidly accept the need for large-scale surprise anticipation. As surprise anticipation becomes more widespread, surprise anticipation centers, both government and non-government, will become more common. An example of the type of surprise anticipation center that will be more common in the future is the surprise anticipation center that is currently being worked on by the Arlington Institute for the government of Singapore. After the SARS crisis, government officials of Singapore realized the need to prevent a crisis like SARS from ever hitting their country again. They also acknowledged the need for preparedness if the surprise could be rapidly detected. The proliferation of surprise anticipation centers, as well as gradually effective techniques coming as a result of their analysis, is what the Arlington Institute sees as the future for Wild Cards.

From the methodological point of view, recent developments are based mainly on information technology. They include

- Wild Card databases
- Internet portals for collecting and assessing Wild Cards
- early warning systems for monitoring Weak Signals hinting at Wild Cards

These elements are combined e. g. in the project iKnow (www.iknowfutures.com).

APPENDIX: OUT OF THE BLUE WILD CARD CATALOGUE

(Petersen 1997)

EARTH AND SKY

- The Earth's Axis Shifts
- Asteroid or Comet Hits Earth
- Ice Cap Breaks Up
- Gulf or Jet Stream Shifts Location Permanently
- Global Food Shortage
- Extraordinary West Coast Natural Disaster
- Rapid Climate Change
- Collapse of the World's Fisheries
- Major Break in Alaskan Pipeline

BIOMEDICAL DEVELOPMENTS

- Bacteria Become Immune to Antibiotics
- Worldwide Epidemic
- Fetal Sex Selection Becomes the Norm
- Human Mutation
- Health and Medical Breakthrough
- Long-term Side Effects of a Medication Are Discovered
- Human Cloning Is Perfected
- Life Expectancy Approaches 100
- Birth Defects Are Eliminated
- Collapse of the Sperm Count

GEOPOLITICAL AND SOCIOLOGICAL CHANGES

- Civil War in the United States
- U.S. Economy Fails
- No-Carbon Economy Worldwide
- Altruism Outbreak
- Social Breakdown in the United States
- Israel Defeated in War
- Collapse of the U.S. Dollar

- Economic and/or Environmental “Criminals” Are Prosecuted
- Rise of an American “Strong Man”
- Stock Market Crash
- Civil War between Soviet States Goes Nuclear
- Major U.S. Military Unit Mutinies
- The Growth of Religious Environmentalism
- End of Intergenerational Solidarity
- New Age Attitudes Blossom
- Religious Right Political Party Gains Power
- Mass Migrations
- Africa Unravels
- U.S. Government Redesigned
- Electronic Cash Enables Tax Revolt in the United States
- Western State Secedes from the United States
- Illiterate, Dysfunctional New Generation
- Collapse of the United Nations
- Mexican Economy Fails, United States Takes Over
- End of the Nation-state
- Society Turns away from the Military

TECHNOLOGY AND INFRASTRUCTURE UPHEAVAL

- Long-term Global Communications Disruption
- Massive, Lengthy Disruption of National Electrical Supply
- Energy Revolution
- Time Travel Invented
- Y2K: The Year 2000 Problem
- A New Chernobyl
- Encryption Invalidated
- Loss of Intellectual Property Rights
- Fuel Cells Replace Internal Combustion Engines
- Room Temperature Superconductivity Arrives
- Developing Nation Demonstrates Nanotech Weapon
- Cold Fusion Embraced by Developing Country
- Global Financial Revolution (E-cash)
- Faster-than-Light Travel

- Virtual Reality, Holography Move Information, Instead of People
- Virtual Reality Revolutionizes Education
- Self-Aware Machine Intelligence Is Developed
- Technology Gets out of Hand
- Humans Directly Interface with the Net
- Nanotechnology Takes Off
- Computers/Robots Think Like Humans

NEW THREATS AND OLD THREATS FROM NEW SOURCES

- Information War Breaks Out
- Major Information Systems Disruption
- Nuclear Terrorists Attack the United States
- Terrorism Swamps Government Defenses
- Terrorism Goes Biological
- Computer Manufacturer Blackmails the Country
- Hackers Blackmail the Federal Reserve
- Inner Cities Arm and Revolt

SPIRITUAL AND PARANORMAL

- The Arrival of Extraterrestrials
- The Return of the Awaited One
- Remote Viewing Becomes Widespread
- Life is Discovered in Other Dimensions/Realms
- Future Prediction Becomes Standard Business

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EXAMPLE OF USE
(from Petersen 1995)

**EXTRAORDINARY WEST COAST
NATURAL DISASTER**

Fear of the “big one” has become a cliché among Californians. Suppose the cliché becomes reality? California and part of Oregon fall into the Pacific Ocean. Los Angeles is wiped out. Millions die, and the economic and emotional dislocation consumes the rest of the nation. Far from only hurting Californians, such an event would be a tremendous blow to the American psyche, as the epitome of the “Go West” American dream goes west for good.

A major California quake is only one scenario of this type. Others are: Mount Rainier erupts, covering the Seattle and Tacoma areas in a foot of volcanic ash; a tsunami strikes the Pacific coastline from an underwater seismic disruption. In every case, the human cost would be horrific. A large portion of the U.S. economy would be affected (California, for example, would be one of the ten largest economies in the world if it were a stand-alone nation); major loss of human and animal life would occur; large-scale civil disorder would be a serious possibility, even in other parts of the nation.

Could it happen? Experts have made forecasts suggesting a high probability of such natural disasters within the next two decades. Present seismic rumblings in the Cascade Range do not bode well.

POSSIBLE IMPLICATIONS	
REALITY	ACTIVITY
 <p>Tremendous blow to the American psyche; return to survival values.</p>	 <p>A large portion of the U.S. economy would be affected.</p>
HABITAT	GROUP RELATIONSHIPS
 <p>In every case a major loss of human and animal life would occur.</p>	 <p>Possible large scale civil disorder.</p>

**EXTRAORDINARY WEST COAST NATURAL DISASTER
WILD CARD EQUATION**

EARLY INDICATORS	IMPACT FACTORS	CHANGE SCALE	
<ul style="list-style-type: none"> • Forecasts by experts suggesting high probability of such natural disasters within the next two decades. • Present rumblings in Cascade Range. 	RATE OF CHANGE ΔC faster change = more impact	1 = years 2 = months 3 = days	3
	REACH R wider reach = more impact	1 → 5 local → global	3
	VULNERABILITY V less adaptable = more vulnerable	1 → 3 less → more	3
	OUTCOME O more uncertainty = more impact	1 → 3 less → more	3
	TIMING T later events = better outcome	1 = 2015-2020 2 = 2010-2015 3 = 2005-2010 4 = 2000-2005	4
	OPPOSITION O_p change resisters vs. advocates	2 → -2 much → much opposition support	0
FORESIGHT SOURCES <ul style="list-style-type: none"> • "Prophecies" by various sources • Single or small number of people who have refined technology for predicting major earth events 	POWER FACTOR P more individual effect = stronger impact	1 → 4 less → more	3
	IMPACT INDEX I_w sum of impact factors	1 → 24 low → high	19
	FORESIGHT FACTOR levels of foresight available	A → F many → few sources sources	B
	QUALITY net effect of Wild Card	+ positive - negative ± both	-