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conditions of use

fo r e f ro nt :

how to be rigorous with scenario planning
*michel godet**

*In a recent issue of **Futuribles,** authors from the European Commission's Forward Studies Unit outlined five scenarios for Europe 2010. The scenarios were constructed using the so-called 'shaping actors, shaping factors' method, claimed by the authors as specific to their unit. In this article, Michel Godet reacts to that claim and makes two fundamental criticisms of their methodology.*

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It is impossible for me not to react to the article 'Europe 2010: cinq scénarios' by three members of the European Commission's Forward Studies Unit and published in the October 1999 issue of *Futuribles*.[1] The methodology used, 'Shaping factors, shaping actors', is presented graphically as 'specific to the Cellule de Prospective of the Commission, the result of ten years of contacts and expertise. As such it seeks to be a middle road between the different approaches that already exist; in other words, more complex than the traditional Anglo-American methods and less mathematical than the tools developed by the French school.'

It is true that a certain French school has become internationally known as the French school of *la prospective*.[2] However, it would be too easy, simplistic, and even unfair to describe the French school, which is a collectivity, in terms of systems analysis tools developed essentially a quarter century ago in the USA, at the Rand Corporation,[3] and in France, at Sema (a firm active in the defence sector), Futuribles International, as

well as the French military's 'Centre de Prospective', and Datar.

For over fifteen years now, I have been honing the tools of *la prospective* by insisting on appropriation[4] through participatory methods and on the use of simple tools to approach complexity, eg through *prospective* workshops[5] or morphological analysis. My message remains the same: an operational imperfection is better than some non-existent perfection. A case in point would be game theory, which is theoretically advanced but unapplied in the corporate world. However, this is not the case for a method like the Mactor method, which may still be improved but remains highly functional.[6]

The approach which I have developed over the past twenty-five years may be characterized as a blend of tools and systems analysis procedures, eg the Micmac method to identify key variables, the Mactor method for actors' strategies, morphological analysis for scenario-building and the Smic-Prob-Expert for the probability of scenarios.[7] Although applying any of the above-mentioned methods or mathematics may prove helpful in general, it necessarily remains of secondary importance.

Of course the tools employed in *strategic prospective* are useful in that they serve to stimulate the imagination, reduce inconsistencies, create a common language, structure collective thinking and encourage appropriation. Naturally they do not replace reflection or freedom of choice. In a sense, we are tilting at two symmetric errors: ignoring the hammer when driving in a nail, or considering every problem to be like a nail hence the hammer is the only solution. In other words, we are introducing tools and then trying to prevent beginners from using them incorrectly.

Obviously these tools do not pretend to be scientific like those in the physical sciences. We are not measuring material resistance factors here. Instead, we are simply trying to consider many unknowns in the most objective manner possible.

It is worth adding that the correct use of these tools is often thwarted by lack or time or money. Their use is conscientiously inspired by intellectual rigour; ie the need to ask the right questions (relevance) and reduce inconsistency in participants' thinking. On the one hand, the use of these tools stimulates the imagination; on the other, it does not guarantee creativity. Here the talent of the futurist, as well as common sense and intuition, plays a major role.

Again, the use of the tools mentioned has little meaning unless it is part of a collective futures-thinking exercise in which structured thoughts and a common language are needed. The tools are not toys or a card game like solitaire. In the end, a futurist working in isolation can depend only on intellectual rigour.

In many cases, we enourage tinkering with the toolbox and and even innovating with new applications for the same tools to answer questions. Think of the humble screwdriver. It not only works on screws but also pops stubborn beer caps remarkably well! The following examples illustrate the practical use of tools within the strategic prospective process.

Two examples of specific tool combinations

At the end of the 1980s, we took part in a forecasting session held by the French armament department (Direction Générale de l'Armement). The project under review was an individual infantry weapon with a horizon line of 2020. We went back to square one with the department's structural analysis which had already been dragging on for three years at that point. With the Micmac method, we set out the 57 variables in a hierarchy so that fifteen key variables stood out. Upon reflection, the participants saw that nine of these variables were components of the weapon itself (eg projectile, aim, energy source) and six other were critera related to evaluating arms (cost, competitiveness, anti-personnel effects). A morphological analysis of the nine components of the weapon, which could each take several configurations, followed and it allowed us to identify 15 552 theoretically possible technical solutions. The combined use of the Multipol method for the multi-criteria choices and the Morphol method for the calculation of exclusion and preference restrictions enabled us to decrease the morphological space to fifty, then to some twenty solutions which were worth examining more closely using additional economic or technical analyses.

Ten years later, one of these solutions made the headlines at a public presentation of the operational prototype. The selected solution: a

1 Gilles Bertrand, Anna Michalski and Lucio R. Pench, 'Europe 2010: cinq scénarios', *Futuribles*, No 246, October 1999, pp 5–23.
2 *Antidote*, CSBS Publications, No 22, 1999, in which three pages are devoted to the French school. See also: Gill Ringland, *Scenario Planning*, John Wiley, Chichester, 1998; M. Godet and Fabrice Roubelat, 'Creating the future: the use and misuse of scenarios', *Long Range Planning*, Vol 29, No 2, April 1996; Hugues de Jouvenel, 'Sur la méthode prospective: un bref guide méthodologique', *Futuribles*, September 1993.
3 See Jantsch's famous book, E. Jantsch, *Technological Forecasting in Perspective*, OECD, 1967.
4 eg the Greek triangle presented in our texts since 1985.
5 Developed by Robert Jungk in the 1960s and rediscovered unwittingly by us while at Renault in the 1980s.
6 For a full example, see its application to food safety and the environment in the LIPS Working Paper, No 11.
7 Michel Godet, *Manuel de prospective stratégique*, Volumes 1 and 2, Dunod, Paris,1997. See also Scenarios and Strategies, a Toolbox for Scenario Planning, accessible on the LIPS website at http://www.cnam.fr/lips/.

'polyarm-multiprojectile' model called PAPOP. This model has an indirect line of target and can be hidden while firing specific projectiles upon immobile, armoured or mobile targets.

At a different forecasting session, this time for the commercial development of the French electrical company (EdF) , the toolbox for strategic prospective acquired a new, innovative use. The horizon line was the year 2010. The structural analysis of the 49 variables considered led us to identify six key questions, such as energy consumption, competitiveness and margin of manoeuvre, We then grouped these questions under three categories or three 'future battle fields'.

The morphological analysis of the possible answers for each of the six key questions and their various combinations enabled us to select the most probable scenarios. Of course the Smic–Prob–Expert method had already 'probabilized' the scenarios. In parallel, the Mactor method was used with some twenty actors involved in the three 'battlefields'. Their strategic positions were later optimized according to the scenarios studied.

The act is thus one of reflection in which it is essential to ask the right questions and avoid the biases and inconsistencies inherent in any group exercise. As a result, I defend the principle that rigour must be applied to what is an 'intellectual *un*discipline' through five conditions: relevance, coherence, plausibility, importance and transparency (appropriation). At this point, I must add once again that *la prospective* and scenarios are not synonyms. We are not here to write scenarios for the fun of it; instead we examine them rigorously according to set conditions. Hence analytical tools, be they mathematical or not, help reveal and reduce inconsistencies.

Given all that has been said thus far, I must express two major reservations regarding the scenarios drafted by the Commission. My first reservation lies in the method used; my second, in the realism of the scenarios selected.

In the first place, the so-called 'shaping factors, shaping actors' method claims to be original; whereas it is an imperfect copy of the method that we have been developing since the late 1980s. Students at the CNAM (Conservatoire national des arts et métiers), participants attending strategic prospective seminars at Futuribles International or employees at dozens of companies where we have held workshops, can attest to this fact.

The description of the method in the Commission's full report remains unambiguous. Even the words sound alike. We find structural

analysis, key variables, driving actors, structured brainstorming in *prospective* workshops. The same stages and techniques follow, eg construction of micro-scenarios, macro-scenarios, using modular morphological analysis. On the basis of this framework, a rather short scenario is written up.[8] I notice that the authors of the report avoided this vocabulary which would betray the origins of the method. Ironically, until now only consultants played around with new names for old ideas.

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The rediscovery of morphological analysis

Morphological analysis experienced a renaissance at the end of the 1980s and became one of the most used tools. Oddly enough, morphological analysis had long been popular in technological forecasting but not in economic or sectoral prospective. Figure 1 illustrates how this tool works well in constructing scenarios.

Figure 1 Relavence, coherence and plausibility of scenario-building through morphological analysis
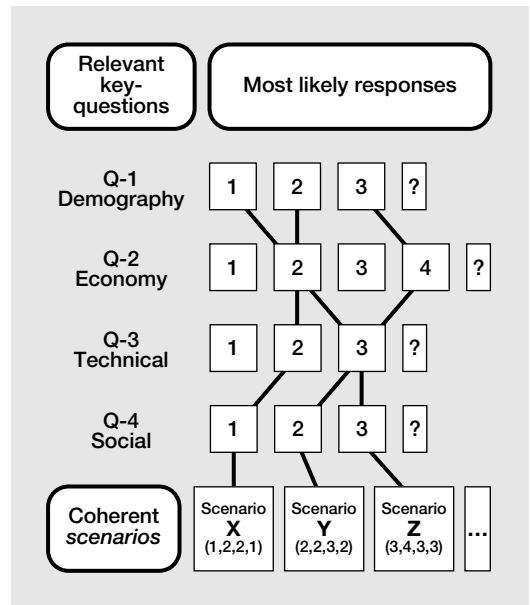
Note: ? indicates all other possibilities.

On the topic of morphological analysis, we rediscovered Zwicky's contribution in 1988−89 during a futures exercise for the French Defence ministry.[9] Given the value and background of morphological analysis, journals such as *foresight* and *Futuribles* should consider devoting a future issue to how this technique, so popular in technical forecasting during the 1970s managed to be forgotten, only to be rediscovered in the

8 Scénarios globaux par l'analyse morphologique', TRP, No 1, *Futuribles International*, 1995.
9 F. Zwicky, 'Morphology and nomenclatura of jet engines', *Aeronautical Engineering Review*, June 1947.

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early 1990s. Since that time it has frequently been applied in futures studies on air transportation, the Catalan region, computerization in Europe, and scenarios in planning at AXA insurance, to name but a few. Indeed, most of these studies have been published in *Futuribles*, the TRP Collection and the LIPS working papers series. Also the Club Crin (an informal French business network) has made morphological analysis its religion of sorts in that it offers companies standard plots for environmental scenarios.[10]

Of course the members of the Commission's Forward Studies Unit know the above history lesson because they actively participated in the scenario-building seminar organized in Paris by the Commission, (Institut de Prospective technologique and the Forward Studies Unit), *Futuribles International* and LIPS in 1995.[11] It would, therefore, be appropriate for the Unit to respect ethics and, in the future, present the 'shaping factors, shaping actors' method as heavily inspired by the more rigorous approaches developed by the French school over the past two decades. These approaches stand out from certain Anglo–American procedures in which only a few factors are considered and formalistic tools are not used to reduce collective inconsistencies, as needed and whenever needed.

In the second place, scenario building by a group of experts always starts with a limited number of structuring variables on the basis of which hypotheses are made. However, even in the most complete exercises, once five or six hypotheses are combined, the scenarios which the experts consider most probable generally have a fairly weak overall similarity with reality. (Note that 'the most realistic' has nothing to do with seeing whether the most probable scenarios take place, but rather whether any single one of all the others arises!)

Indeed this is what using the subjective probability of the hypotheses provided by the same experts will reveal once we correct their inconsistencies using the Smic–Prob–Expert. The Smic–Prob–Expert gives an indication of the order of magnitude of the probability of the scenarios selected, again, by the same experts. The example provided by the iron and steel industry is especially revealing in this respect (see Box 1). The six scenarios envisaged by the experts had an overall probability rate of 40% when simple and

conditional probabilities of the structuring hypotheses were questioned. Use of the Smic–Prob–Expert method produced three scenarios which were far more probable than those selected, let alone identified, by the same experts. Why? These three scenarios went against implicitly shared conventional thinking. The method thus revealed collective biases which would otherwise have been left unsaid.

Box 1 The probability of scenarios for the iron and steel industry (with some surprising consequences)

Between 1990 and 1991, several months of prospective reflection on the iron and steel industry in France on the horizon of the year 2005 enabled participants from Edf (the French electrical utility) and Usinor to identify six relevant and consistent scenarios constructed around three general hypotheses: H1 (low GDP growth, below 1.8%); H2 (severe constraints on the environment); H3 (strong competition from other materials):

Black (S 1) poor growth in GDP and strong competition from materials
Morose (S 2) poor growth in GDP with no strong competition from others materials.
Tendential (S 3) continuation of the current situation.
Ecological (S 4) strong constraints from the environment.
Pink Steel (S 5) strong growth of the GDP and competition favourable to steel.
Pink Plastic (S 6) strong growth of the GDP and competition favourable to other materials.

Use of the Prob-Expert software enabled us to pick out only six scenarios which covered only 40% of the field of probabilities:

S5 Pink steel and S4 Ecology	(010) = 0.147
S1 Black	(101) = 0.108
S6 Pink plastic	(001) = 0.071
S3 Tendential	(000) = 0.056
S2 Morose	(100) = 0.016

Three new, far more probable, scenarios thus appeared which the experts had not even selected, let alone identified, because these scenarios went against implicit or shared conventional thinking. This type of consensus, all the stronger since it remained unsaid, is the source of major collective prejudices.

The three remaining hypothesis configurations (60% of global probability) each have an implementation probability superior to the most probable of the scenarios previously retained.

S7 Ecological black	(111) = 0.237
S8 Steel green	(110) = 0.200
S9 Plastic green	(011) = 0.164

The pair (111) in the first two hypotheses H1 and H2 had been eliminated because, in a context of sluggish growth, serious constraints from the environment seemed to be an improbable luxury. The pair (110) had been eliminated because serious constraints from the environment (H2) seemed somewhat favourable for steel which at the same time was not subject to serious competition from other materials. However, why did no one imagine plastics that could be recycled or were even bio-degradable, as suggested by the last scenario (011)?

I would like to know what the readers of the Commission's report think, ie regarding the plausiblity of the five scenarios the Commission presents. After reading these scenarios and knowing the highly subjective selection method

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10 'The Club CRIN Prospective scientifique et technologique-Entreprises 2010, 'Construire des scénarios d'environnement global', TRP, No 5, *Futuribles International*, January 1997.
11 *Scenario Building*, the proceedings of the Profutures workshop organized by LIPS, Futuribles International and IPTS, EUR-172298-EN, 1995. (see my contribution on morphological analysis within the international context). Also published in TRP No 1 entitled, 'Construction de scénarios globaux par l'analyse morphologique', *Futuribles International*.

used, I readily wager that they would not surpass 10% to 20% that we find in comparable exercises of 'scenario entertainment'.

It would be interesting to see, as in the case of the iron and steel industry, the probable scenarios left unexplored because of conventional thinking or clichés which blur the vision of futures-thinking groups. Without any probability testing whatsoever, the authors can pen nice tales. Admittedly, they are not the first to dabble in their genre which, at least in this case, is well written.

When I went to Brussels in 1996 to present the fruit of twenty-five year's work – our approaches, our tools and participatory practices – I thought that I was contributing to the reputation and spread of the French school of *la prospective*. It goes without saying that the intellectual competition is fierce given the Anglo-American domination in any area related to strategy.

As a former civil servant within the Commission and as the author of one of its earliest futures studies,[12] I take some comfort in the fact that after twenty years of encouraging appropriation, the Commission has caught on to our methods and practices. I would have preferred a more complete transmission of knowledge and experience. Yes, there is much to be done if rigour is to infuse this intellectual *un*discipline and if the academic rules in more established disciplines are to be applied, and respected here, too.

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12 M. Godet and O. Ruyssen, Old World and New Technology, published in 1980 in the collection Perspectives européennes. This report began with a description of the prospective approach that I had developed at Sema.