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SCENARIOS TO CHALLENGE PARADIGM SHIFTS : LESSONS FROM 2025

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Abstract
As a process looking for alternative visions of environment and corporate futures, scenario planning challenges strategic paradigms. In that way, scenario planning is dealing with the different beliefs of the many actors who make the organization and its global and business environments. Among these beliefs, emerging ideologies are one of the main shaping factors for the construction of new visions of corporate environment and corporate futures. To analyze the interaction between scenario planning and emerging ideologies, this paper will first propose a conceptual framework based on the dynamics of strategic paradigms. Second, it will discuss Electricité de France 2025 scenarios longitudinal case study in the context of the diffusion process of the French so called *prospective* approach to show interests and traps of scenario planning to manage paradigm shifts.

Key words
Ideology, network, paradigm shift, scenario planning

1. Introduction

Since the mid-seventies, scenario planning has entered strategic planning literature to show how far scenarios are used in organizations [1, 2], how they can be integrated to strategic management [3, 4] and how they can help organizations to learn from changing environments [5, 6]. As a networking process helping the organization to build alternative visions of environment and corporate futures [7], scenario planning has become a social process which implies the collective participation of a variety of actors – top and middle managers, academics, public policy makers. Thus, scenario planning plays a sensemaking role [8] to challenge strategic paradigms of organisations and to rethink their internal and external borders.
Building collective representations of possible futures, scenario planning appears to be very close to producing ideologies, considered as consistent systems of ideas and beliefs explaining behaviors and leading to an action consistent with these beliefs [9]. To explain the dynamics of scenario planning in organizations and its relationships with ideology producing, this contribution will first propose a conceptual framework based on Kuhn's approach of paradigm shift [10] as transposed to corporate strategy. The framework will be in a second part applied to Electricité de France longitudinal case study.

2. Scenarios versus strategic paradigms : conceptual framework

Kuhn's approach of scientific revolutions is based on discussing how the sets of received beliefs and shared assumptions which found scientific communities

can be challenged. These beliefs and shared assumptions, accepted and defended by a scientific community, form what Kuhn calls a scientific paradigm. And within this paradigm, normal science deals with « puzzle solving » following rules to find solutions consistent with paradigmatic assumptions, so that accepted beliefs are generally not challenged and the paradigm is strengthened through research. The paradigm can however be broken when an « anomaly » occurs. As a result of this anomaly, shared beliefs and assumptions can no longer be used as foundations for problem solving. New ones have to be found to form a new paradigm, competing with the old one. If we consider as strategic paradigms [11] the collective representations within an organization which explain the corporate strategic action, Kuhn's conceptual framework can be used to explain the dynamics of scenario planning in the evolution of such strategic paradigms.

To adapt Kuhn's conceptual framework to explain the role of scenario planning in the strategy process, we first have to identify the community at work in the process. Actually, scenario planning stresses the contact between differential and complementary views to produce different logics for the future. Thus, the methodology of scenario planning leads to a more or less formal system interacting people in order to gather visions, e.g. images of the future produced through imagination, and beliefs about the future. These visions and beliefs are then used to set up scenarios.

The first stage of the scenario planning methodology requires that a group or panel of internal or external actors be formed. Within a group, actors work together to generate grids of representations, whereas in a panel of actors, each one is questioned individually, as in the Delphi method. Groups and panels may, however, be combined, for example, one group may decide to hear experts from outside the company or have the group discuss the results of a survey already administered.

Basically, actors will bring beliefs and visions linked with two functions, an analytic one and an ideological one (table 1, adapted from [12]). The first one tries to show some « scientific » evidence from analysing trends and emphasizing uncertainties in models. In this mode, shaping actors are mainly experts, e.g. people having scientific knowledge in the field or in organizations staff positions. The second one, that Barel calls the ideological mode, is based on action processes, so that beliefs and visions about the future are coming from actors' and organizations' strategies or even utopias. In this mode, dominant actors will be more often policy and decision makers, either top or middle managers.

Table 1
Two functions for scenario planning

analytic function	*Ideological function*
- prediction through modeling - decision support - assessment of past and present - gaming	- mobilising for a project - demobilising by diversion, optimism or pessimism - creating ideologies - entering a debate to get ressources

Depending on the context of the scenario planning process, e.g., discussion of the future of a firm or an industrial sector, the group or panel of actors may also include either internal actors or a mix of internal and external or even exclusively actors drawn from different organisations. As a result, the groups or panels will be more or less heterogeneous, which necessarily affects the type of information generated. Indeed, the more homogeneous the group, the greater the risk of one single vision of the future only, contrary to the true objective of scenario planning which is to build differentiated images of the future. Note that the level of expertise among the various members of a working group or committee does not guarantee the quality of scenario planning, because group members could have identical beliefs, linked with a dominant paradigm.
Each member of a scenario planning group brings, with his/her set of beliefs one or sometimes 2 or 3 visions of the future that will be confronted to produce scenarios each one emphasizing a different logic, e.g. different driving forces. By relying on the gaps between the representations produced and the organization dominant logic, scenario planning actually becomes an exercise that questions strategic paradigms (table 2).

Table 2
Scenarios driving forces and paradigm shift

Scenario driving forces	*Link with the dominant paradigm*	*Impact on paradigms*
Trends	Assumptions coming from the dominant paradigm	Often strenghten the dominant paradigm most of times puzzle solving but can reveal an anomaly
Wildcards	Trend-breaking assumptions often coming from innovation and actors' strategies	Challenge the dominant paradigm by emphasizing a surprising or improbable development, or a major uncertainties

When driving forces are based on trends, the assumptions of the scenarios are often consistent with the dominant paradigm so that such scenarios rarely

challenge the dominant paradigm. Strategic problems are here like puzzle solving but can reveal an anomaly when some of trend scenarios appears to be no longer consistent with the dominant paradigm. In terms of methodology, such scenarios are always looking forward from past to the future in an exploratory mode. Main resource people for such scenarios are classic experts, bringing scientific knowledge.
Emphasizing a major uncertainty, or wildcard, produces a second category of scenarios challenging the dominant paradigm. Here, wildcards are like anomalies which challenge the dominant logic and force to imagine new corporate environments and strategies. In an exploratory mode, these wildcards are trend-breaking assumptions. In an anticipatory mode, imagination is the main source of backward induction scenarios coming to the present from the future. In terms of resource people, decisions makers or actors coming from external fields will explain or imagine how strategies can change the future. When such scenarios are promoted, or are rejected, by some groups of experts or actors, they often reveal an emerging ideology which can become a competing paradigm.
However, organisational structures are rarely adapted to questioning the dominant paradigm and even less adapted to creating alternative representations. Hence the need to set up a scenario planning network located outside the traditional corporate structure. This network would be based on either informal or at least non-hierarchical connections and could even extend beyond the organisational borders as the EDF case study shows it.

3. The rise of the prospective approach : the future to see the shifts

3.1. Methodology : from a longitudinal study to a theoretic discussion

During the 90 decade, EDF (French public electricity utility) became one of the world main user of scenario planning, both by its internal scenario planning activity with a foresight unit of 10 full-time staff executives and its leading role in creating networks such as « Entreprises et prospective » [13]. This involvment in scenario planning is both linked with new issues from a changing political environment with the deregulation process of public utilities and with an old practice of looking forward to anticipate new technologies such as nuclear powerstations.
As a longitudinal case study [14], the case is first presented in its historical context, e.g. the diffusion process of the « prospective approach » in French organizations. EDF own practices of scenario planning are then examined.
Each part is based on first hand data crossing semi-directing interviews of internal and external actors, published writings of these actors (papers, books) and non-published internal documents such as group reports. The stories that have been collected are then discussed with the conceptual framework described section 2 to see how far futures studies and more specifically scenario planning participate in challenging old strategic paradigms by producing new ones. With EDF case study, the role of emerging ideologies in 2025 scenarios is emphasized and the limits of the impact of scenario planning is discussed.

3.2. The context of the case : the making of networks to manage paradigm shifts

If we review the rise of the French *prospective* approach [15], the most striking feature is that corporate executives initially became interested in organised futures thinking outside their companies. Thus, each phase of the diffusion of the prospective approach can be illustrated by the founding role of a company using futures networks to challenge its strategic paradigms. Thus, each phase of the diffusion process of the French *prospective* approach can be illustated by its implementation to companies using futures networks to change their visions of their environments and of their strategies (table 3).

Firstly, when the Centre international de prospective (CIP becoming then Centre d'Etudes Prospectives) was created in 1957, Gaston Berger set up a network of first rank company managers, top civil servants and academics.

One of the Centre's earliest experiments in « applied *prospective* », as opposed to « global *prospective* », dates back to 1961. This early applied effort involved Snecma (aircraft engines), in fact it was mandated by Henri Desbruères, President of Snecma. Also involved were various members of the CIP, for example, Pierre Massé the head of the governmental planning commission and one of EDF founding directors after world war II. However as Desbruères readily pointed out, this endeavour stemmed not only from one executive's interest in *prospective* but also from a necessity at Snecma. Already in the early sixties, a new type of industry was emerging along with the project to build a supersonic airplane, the future Concorde. This type of industry could thus be situated within a process that is both industrial and political.

In actual fact, a few months later, the supersonic issue led to intense debate within the governmental planning commission, another area where *prospective* would develop. At this point, futures thinking appeared as a vector of cultural change - not only internal but external, too. As Desbruères put it, futures thinking was « targeting all the spheres which form the context of Snecma ». Through the discourse it provides, futures studies seeks to be a tool to change perceptions of the environment not only from within but also from without, especially through associations with people from outside the company. From the beginning, it was thus clear that looking forward was designed as a process helping new ideas challenging collective representations of organization environment.

Table 3
Networks and Corporate Scenario Planning in France, 1960-2000

Period/Case company	*Executive/ Advisor*	*Paradigm shift/emerging ideologies*	*External Networks*
1960s Snecma (aircraft engines)	Henri Desbruères/ André Gros	constitution of European aircraft industry / alliances have to be made to survive	Centre d'Etudes Prospectives, National planning office
Late 1960s-early 1970s Elf (oil and chemicals)	Pierre Guillaumat/ Bernard Delapalme	transformation of the oil market / oil producing countries will soon make the game	National planning office, futures thinking activities for Defence Dept.
Late 1980s-1990s EDF (electricity utility)	Jean Bergougnoux/ Jacques Lesourne	European deregulation / utilities are a market like others	Entreprises et prospective, Futuribles

At the end of the sixties, scenario planning began to develop in corporations within the energy sector, for example, at Elf and Shell-France. Here again, we can trace a direct link between internal and external futures-thinking activities at a time when most players in this sector anticipated a major change in the oil market, with the shared idea that countries where oil reserves are located will soon make the game and the price.
In 1969, Pierre Guillaumat, head of Erap and Snpa (the two oil companies which would later merge as Elf in the mid-seventies), gave a special mandate to Bernard Delapalme, director of R&D. The mandate was a study on Elf with 1985 as the horizon line. For both gentlemen, the study resembled « Views for 1985 », a project they carried out as president and rapporteur, respectively, at the planning commission.
Of course, it comes as no surprise that Pierre Guillaumat launched an exercise in applied *prospective* almost five years after the group finished « Reflections for 1985 » . The gap between the two studies was too great for mere transpositions to be made. In fact, 1969 appears to have been a watershed year for the entire energy sector. It was in 1969 that the French nuclear power program was entering its industrial phase by choosing the Westinghouse technology of pressurized water reactors (PWR) and that the first oil deposits were discovered in the North Sea. Moreover, the future of Elf would depend on Algerian oil, at least for 70% of its supply. Bernard Delapalme's six-member working committee included people from both Erap and Snpa who were assigned to the task on a part-time basis. There were also external advisors, such as Hugues de l'Estoile, head of the *Centre de prospective et d'évaluation* (foresight unit of the Ministry of Defence), as well as Michel Pecqueur, Assistant Director, enriched uranium development division, at the Atomic Energy

Commission. This opening up to external advisors represents an important step, but it should be mentioned that Pierre Guillaumat had been Deputy General Director of the Atomic Energy Commission and the Ministry of Defence. Meanwhile, a group from the energy sector was gathering as a think tank at the Planning commission for the future of energy. Included in the ranks were several familiar faces, for example, Bernard Delapalme, Michel Pecqueur, Jacques Lacoste (economic research at EDF) and Pierre Wack, pioneer in scenario planning at Shell-France and later in London. In that case, the paradigm shift was the transformation of the energy sector which would come in 1973. Scenario planning helped organizations to think about a possible rise of oil prices as Pierre Wack narrated it for Shell [5] or to promote nuclear power plants as a solution to replace fossil fuels. In all these works, emerging ideas about the future produced trend-breaking scenarios, that is not always so easy in a participatory process. Indeed, in 1963, « Views for 1985 » was not allowed to deal with foreign affairs and defence issues, so that it was not possible for the group to imagine the energy paradigm shift ! This was partly a defence of the old paradigm considering that the wide diffusion of such emerging ideologies could fasten the emergence of the new one. Here puzzle solving continues to manage the end of the old one, especially in terms of cash cows : if one wrote and said that oil countries would make the price, one might create a self-fullfilling prophecy, so that all actors has to maintain a puzzle solving phase as long as possible, even if they knew that a « shock » was likely to occur.

Since the mid-eighties, especially in the French public service sector, scenario planning and futures thinking explicitly became tools to manage strategic changes because they enabled participants to anticipate and understand developments in the environment. State owned corporations did continue to play a special role in the development of futures-thinking networks.
Overall, there have been two chronological phases. The first phase ran from the end of WWII until the eighties and may be linked to the design and implementation of long-term public programs to equip and support the national infrastructure, e.g., electricity, rail transportation and telecommunications. All of these programs required a long-term vision beyond sectorial or technological definitions that would include macro-economics and, especially in the case of energy, geopolitics. The second phase, begun as the eighties ended, is linked not only to this programming effort but also to a change in the institutional environment of public sector corporations, called deregulation. For these companies, whose status, legal constitution and area of activity were all regulated, the change of strategic paradigm grew particularly complex and was based on time lags. Since these public, or crown, corporations had only partially mastered their capacity for change, scenario planning provided them with a finely honed tool for the circumstances. The corporations then had to anticipate changes in the proverbial rules of the game and prepare accordingly, both internally and externally. The main characteristic of this type of change is its irreversibility throughout an organisation. In other words, all levels of the corporation are involved and « puzzle solving » could not bring strategic responses to changes which were anomalies for the old paradigm as shown in EDF case study.

3.3. EDF in 2025 : scenario planning as a forum for discussing emerging ideologies

For EDF, the paradigm shift has been highlighted in the mid-eighties by the report « EDF in 2025 », produced by the utility's experts in economic studies. The report was mainly based on (at that time) emerging ideologies such as deregulation, European construction and decentralization which would shape changes in behaviour on the part of public authorities (state and local), as well as on the emergence of Europe as a new actor on the institutional environment of the company.
In that framework, many logics of change could be imagined (table 4). The first logic was the one of continuous change, consistent with the dominant paradigm but which could show some limits, especially related to excessive capacity productions. However, in these classic macro-economic scenarios, actors and strategies do not change. The most interesting families of scenarios are the « strategic change » and « european surprise» where institutional actors radically change the business environment and the company itself. Here driving forces were imagined to be various, such as « Thatcher's ideology » applied to France or Europe making new rules.

Table 4
EDF in 2025 : sources for a paradigm shift

Scenarios	*paradigm evolution*	*related strategic issues*
continuous change (business-as-usual scenarios)	continuity of the paradigm based on macro-economic and energy assumptions	business-as-usual reveals some limits of the dominant paradigm by considering unlikely a continuous growth of the domestic energy consumption and questioning the recent investments of the company
Strategic change/european surprise (surprise scenarios based on changes in institutional relationships)	paradigm shift through changes in the management of state owned entreprises and in the regulation of utilities	changes strategic and organizational boundaries by making « thinkable » the possibility that the company be private and/or unbundled and that the market become european
nuclear surprise (surprise scenarios based on an industrial accident)	nuclear accident changing the technico-economic paradigm based on nuclear powerstations	impact of sustainable development for long range nuclear waste management

As output of this study, 2025, which was the horizon to replace nuclear power plants, could no longer remain the basic strategic horizon of the company. And compared to the possible scenarios that could be imagined, the technico-economic paradigm shift from the late sixties appeared to be just a puzzle solving activity which did not radically change the company. Even the

organization of futures thinking changed and became more participatory, shifting from the economic studies division to a committee made up of corporate directors and a few major experts who defined more indepth themes for futures-oriented studies based on a process involving various actors including experts, as well as top and middle managers.
All the actors involved took part in creating working groups to produce scenarios and related strategic options then discussed for 80 % of the themes studied to the board if directors. As a process, these future-oriented studies broaden the audience for scenario planning within the corporation since forming groups involved all managerial levels.
While trying to highlight constrasting possible futures, the group's make-up may not necessarily follow any « heterogeneity criteria », especially for sensitive topics like human resources management. In these cases, members are chosen in order to ensure representation of a certain division or function. The process is then at risk of excessive homogeneity. Homogeneity does cripple creativity through a phenomenon called « groupthink » [16]. Consensus may start to appear as well as self-censure, thus eliminating those scenarios or hypotheses that do not fit the dominant paradigm, especially when asking the question of the company and all of all employees status. In such cases futures thinking falters as the perspective shrinks to the consensual hypotheses only, e.g. often the core of the old paradigm, and reject all anomalies that would change the face of the company.
Heterogeneouness was nevertheless activated through the use and making of external networks. In the early nineties, Jean Bergougnoux and Jacques Lesourne founded a corporate club called « Entreprises et prospective » (*Business foresight*). Club membership included public sector corporations and was actually formed in order to have joint futures studies in an informal context. Study topics would include special retirement plans or issues related to the status of utilities in the context of European deregulation. Within this structure, scenario planning appeared to be not just an internal sensemaking process but also an opportunity to confront and contrast one company's members visions and beliefs with those of different organisations facing similar problems changing their strategic paradigms.
External networks, such as the « Entreprises et prospective » club enabled people to continue their discussions and thoughts and even play a pioneering role for future exercises in the company itself. These networks also let corporate strategic reflection spread as a way of thinking through think tanks and international networks, e.g. the Global Business Network (California-based network) or the Centre for European Policy Studies (CEPS, Brussel-based think tank) as Europe had become a major institutional level.

Conclusion and further research

To challenge strategic paradigms, scenario planning uses primarly trend-breaking uncertainties which can be based on emerging ideologies, considered as sets of beliefs which could explain the action of a group of actors. The creation of these scenarios relies primarily on subjective data, generated when experts and decisionmakers are brought together to compare their visions and beliefs with the future, which can reveal emerging ideologies. In such a process,

the most interesting issue is often to see how different actors accept a scenario and its possible impacts both on the business environment and on the company itself, e.g. in most cases how they can live with an emerging ideology which could become the framework for a new dominant paradigm.
With the EDF longitunal study in the context of development of the French prospective approach, we realise the interest, limits and traps of scenario planning as input of the corporate strategy process. Primarly, scenario planning helps the organization not only to look forward but also to look wider, e.g. to enlarge its strategic space, which can challenge strategic paradigms. However, such a change in collective representations is not so easy to manage, as some actors may refuse to consider some emerging ideologies or be prisoner of « groupthink ».
Actually, using Kuhn's conceptual framework of « scientific revolution » to explain the dynamics of scenario planning emphasizes the importance of considering the company and its environment as communities of actors. In terms of further research, the study of the relationship between scenario planning and corporate culture [17] could be fruitful as it is considered as a key factor to deal with strategic dissonance [18]. The possible diffusion of information and communication technologies to support scenario planning [19] is another field for further research, concerning both techniques and processes. This would mean to enter more clinically ideological functions of scenario planning which causes two difficulties. The first one is related to the political possibility to know and to tell everything about power and influence in and around organizations. The second one is coming from the various tracks that ideas follow to influence action, which is often the problem to assess scenario planning.

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