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Futures literacy: A hybrid strategic scenario method

Riel Miller*

Senior Visiting Fellow, Danish Technological Institute, Tecknologiparken Kongsvang Alle 29, KD-8000 Arhus C, Denmark

Abstract

What stories do we tell about the future? This article develops a topology of storytelling about the future, which is used to develop a definition of ‘futures literacy’. It goes on to outline a hybrid strategic scenario method for acquiring the capacities of futures literacy. © 2006 Elsevier Ltd. All rights reserved.

The human condition can almost be summed up in the observation that, whereas all experiences are of the past, all decisions are about the future. The image of the future, therefore, is the key to all choice-oriented behavior. The character and quality of the images of the future which prevail in a society are therefore the most important clue to its overall dynamics.


0. Introduction

People think about the future all the time. In the morning, when they wake up and start planning for the day ahead. At the dinner table, when they discuss how to pay the bills next month or what will happen in the Middle East. Most of these reflections are about the short term, a few days, weeks or months. Such conversations are a natural mix of people’s hopes and fears with a wide range of probable to improbable expectations. Professional forecasters trying to predict tomorrow’s weather or next year’s economic growth handle degrees of probability more carefully. Professionals tend to focus on getting to the highest

*Tel.: +336 3239 1360.
E-mail address: rielm@yahoo.com.
probability prediction that available models and data can provide. They generally steer away from considering the broader, less predictive question of what might be possible as well as the more normative question of what is desirable. This choice, while understandable in light of our deep hunger to know the future, has important limitations.

Two drawbacks of the search for greater predictive accuracy are worth highlighting. First, there is the familiar risk of adopting forecasting methods and models that depend too heavily on what happened in the past. Yesterday’s parameters may do a good job at tracking past events, but experience shows that this approach consistently misses major inflection points related to long-run transformative changes [1–5]. A second, less remarked danger is that a preoccupation with what is likely to happen tends to obscure outcomes that may be unlikely but still possible and potentially more desirable. At best, seeking the reassurance of greater predictive certainty tends to overlook what is viewed as less likely. At worst, it lulls us into a false sense of having exhausted the available options, thereby narrowing the set of choices considered actionable. This, in turn, can impair strategic decision-making¹ because it leads to an underinvestment in imagining less predictable outcomes and the avenues for reaching them.

Futurists, in their efforts to satisfy the yearning for “scientific”² consideration of the future, have been aware of these problems for a long time [6,46,47,52,53]. Currently, most futurists formally recognise the impossibility of assigning meaningful probabilities to the way a society or organisation might function in 10 or 20 years. Notwithstanding this formal nod to the inadequacy and failures of the predictive quest, little progress has been made in developing practical alternatives [54]. Three of the many reasons for this inconsistency between theory and practice were/are: a fear of the future that drives a deep desire to know (divine) what will happen (clients want predictions); recent (post WWII) relative systemic stability and the related success of planning in this context³; and lack of experience with, and hence under-development of, the conceptual tools and behavioural conventions that make it practical to embrace non-predictive approaches to decision-making with success. Old paradigms do not cede easily, and the attachment to predictive approaches rooted in trend analysis, forecasting models, multi-factor calculations, etc., is tightly integrated with the way risk is managed and decisions are taken in industrial society.

The premise of this paper, without claiming any degree of probability, is that the world around us today, in its evolving conceptual and practical attributes, is creating a context that, on the one hand, is dispensing with industrial era modes of perpetuating systemic stability, risk management, decision-making, etc., and, on the other hand, is embracing complexity, heterogeneity and spontaneity as opposed to simplification, homogeneity and

¹Strategic is used here in the sense of an open (i.e. un-predetermined) selection of an objective(s) (what matters) and, subsequently, an open search for the choices deemed essential for realising the goal(s) (what matters for what matters).

²Scientific is defined here in a rather minimalist fashion as analysis based on explicit and open methods that test hypotheses pertaining to a particular subject through inter-subjective evaluation.

³This point is a major topic in its own right. Briefly, the main hypothesis is that the post-World War Two social order, in most industrial countries, was dominated by closed hierarchical decision-making systems that generated bounded predictive planning horizons consistent with the (partly self-fulfilling) continuity of continuous improvement to that system (Kaizan). Two distinctions are important here, one between transformative and non-transformative incremental change, and the other between systems where planning (ex-ante choice) sustains the system and those where it does not.
planning. As a result, it is hypothesised that modal or non-predictive narratives (scenarios) [7,8] could become more important and more practical, for two reasons.

One reason is that if the conditions for change in systemic sustainability (change in the conditions of change [9]) are emerging, then the role of “what-if” imagining becomes central to making the choices (individual and collective) that, in turn, are pre-requisites for actively pursuing such “transition scale” change [10]. In other words, explicit choices in both the individual (behaviour, aspirations, etc.) and collective (institutions, rules, etc.) spheres are fundamental to operationalising societal transformation and, hence, so are the methods for imagining the choices that are outside the old order.5

Second, more specific to this particular historical period is the growing importance of non-predictive imagining owing to a shift towards greater spontaneity in decision-making. Learning-by-doing, experimentation’s successes and failures, is generating the concepts and techniques for embracing the richer, more accurate information available to just-in-time decision making.6 Practice is evolving the networking, diversification, openness, trust, and fluidity that makes it feasible to be spontaneous and rely on complexity rather than fight it.7 All of this calls for an enhanced capacity to imagine the possibilities of the moment without succumbing to the temptation to plan the future based on probabilistic calculations about the unknowable [8].8 Instead, as discussed in more detail at the end of this article, the capacity for more imaginative storytelling becomes the way to use the potential of the present more effectively and, assuming that people’s choices are consistent with their values, evolving in ways that realise our aspirations.

Clearly the hypothesis that non-predictive scenarios are gaining in importance is itself rooted in a scenario of how post-industrial society might function [10–13], a reminder that there is no escaping the interpretive lenses that always filter, reflexively, our perceptions and analyses. From this self-awareness starting point, the rest of this article offers a partial overview of one way of making sense of how stories about the future may be developed and used in our emergent, perhaps eventually post-industrial societies.

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4 Systemic change of this kind is very rarely absolute. Rather, it is compositional in nature, i.e., the shares of certain types of activities in the total changes. Most often, such changes in overall composition occur owing to the ascendance of new components that gradually move toward preponderance rather than a decline (in absolute terms) of the old components. In other words, in certain domains, the simplification, homogeneity and planning of mass-society continues, but as a much smaller relative share of the total activity of society.

5 NB: Revealing choices does not necessarily imply anything about the probability of particular outcomes.

6 Where $P_d$ is a planned decision based on the information available prior to the decision $I(t-1)$, $S_d$ is a spontaneous decision based on the information available both prior to and at the time of the decision $(I(t-1)+I_t)$, therefore, all other things being equal, there is more information available for $S_d$ than $P_d$. In part, this article is an analysis of one of the conditions that would need to hold for this assumption to be true, specifically the capacity to ensure that $I_{t-1}$ does not reduce $I_t$ but enhances it.

7 Changes of this kind are often generational, meaning that young people who swim in the waters of complexity are not only more at ease than their elders who grew up on land, a less complex and mostly two-dimensional terrain, but are capable of conceiving and doing things that the elders simply cannot. Such generational shifts that transform, for instance the perception and management of risk, may be one of the primary attributes of changes in the conditions of change of social systems.

8 The border line between possible and probable is not a fixed line. Both are estimations of the likelihood of an event actually happening in the future. However, possibility slips only modestly over the threshold from impossible to plausible while probability pushes above this minimum to become a positive degree of predicted occurrence (a point discussed further in Section 2.2).
1. The challenge of choosing a story to tell

Stories may be what make life intelligible. Certainly, humans invent and tell many kinds of stories for many different purposes. Future scenarios (FS) are just one specialised type of story, most often invoked in the context of complex and ambiguous situations [14–17]. As with any story, one of the primary challenges is how to imagine and then select a few distinctive and pertinent narratives from the vastness of the imaginable [18]. There are two commonly used methods for solving the problem of how to choose specific stories about the future.

The first, springing directly from the predictive tradition, takes an initial starting point, for instance population or economic output, and then develops scenarios on the basis of a range of growth rates—low, medium and high. This method can be called the baby-bear, momma-bear and papa-bear approach (Bear for short). The second technique focuses more on preferences and expectations in order to sketch scenarios that capture the stories of the futures that people consider to be: the most desirable, the least desirable and the muddling through version that mixes a bit of good and a bit of bad (which also usually happens to be the one people consider most likely or realistic). This method can be dubbed “the good, the bad and the ugly” approach (GBU for short).

Both of these methods generate FS with the virtue that the stories are usually quite familiar. For instance, it is easy to recognise Bear scenarios regarding the future of, for instance, universities that are distinguished by differences in enrolment growth rates—low (baby-bear), medium (momma-bear) and high (papa-bear). Or GBU scenarios that are distinguished by the preferences of people whose values, for instance, lead them to consider the “good” scenario to be one where universities are exclusively citadels of a pure search for knowledge, the “bad” scenario to be one where universities are exclusively driven by the commercial imperatives of funders from the private sector, and a muddling through or “ugly” scenario, usually seen as the most likely, that combines both pure and commercial options.

Many foresight exercises generate a composite scenario matrix by mixing and matching a variety of trends (Bear) and preferences (GBU). For example, Table 1 combines three sets of scenarios (1 GBU and 2 Bear) for the future of tertiary education. Purely for the sake of illustration, the GBU scenarios, based on knowledge-driven versus commercially-driven models of tertiary education, are crossed with two categories of Bear scenarios based on (1) technological change and (2) enrolment growth rates. Building up this kind of matrix can rapidly generate numerous stories, 18 in this case, for the future of tertiary education.

Relying on Bear/GBU methods to produce FS has its strengths and weaknesses. On the positive side, Bear scenarios can lean heavily on readily identified trends and the findings of the “predictive social sciences” such as economics and demography. Whereas GBU scenarios, generally developed by teasing out the expectations and values of specific constituencies like business executives, groups of experts, citizens in a local community,
etc., usually have the virtue of generating stories that are, at least initially, easy to comprehend.

On the negative side, there is an obvious problem when the scenario matrix gets out of hand as more variables, rates of change and preferences are added. The explosion of permutations and combinations reflects the richness of people’s perceptions, but makes it difficult to distinguish the different stories in meaningful ways.\(^\text{10}\) Even more damaging, as anyone who has experienced these processes knows, because the variables are often highly incommensurate and lack explicit and/or tested hypotheses regarding basic definitions, causal inter-relationships or weighting in terms of the model’s parameters, it becomes difficult to use these scenarios for deeper analysis and decision-making\(^\text{[21]}\).

How serious are the limitations to FS arising from a reliance on Bear/GBU methods as a way to select and specify stories about the future? The answer to this question depends almost entirely on the purpose or task to which the scenarios are being put. There are clearly certain tasks, such as building temporal awareness and revealing shared or divergent assumptions and goals, where using GBU/Bear methods is highly effective, precisely because it surfaces values and expectations. However, crucially, when it comes to policy analysis and strategic decision-making, the flaws in these two approaches to building scenarios are serious enough to compromise effectiveness.

Three problems with Bear/GBU methods for generating analytical and strategic FS come to the forefront.

First is the limited realm of the possible when, as in most cases of applied scenario development, the GBU/Bear narratives originate either in people’s current (usually unexamined) expectations and preferences or in the framework of predictive modelling.

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\(^\text{10}\) Techniques like cross-impact matrices can be helpful as a way to winnow out the permutations into a handful of scenarios that can be analysed\(^\text{[5]}\). However, unless a careful distinction is made (see Godet\(^\text{[5]}\)) between participatory and analytical phases, there is a significant danger of constructing models where the variables and hypotheses that make up the model are impressionistic rather than analytical, even when based on “experts opinions”, leading to the old problem that even if the cross-impact calculations are done using sophisticated techniques, it is still a problem of “garbage in-garbage out”. If the reduction process does not follow rigorous selection criteria that reflect a theoretically coherent model to reduce the number of outcomes, then not only are there arbitrary losses of information, but there is also a serious risk of poor specification robustness of the outputs, i.e., the reduced set of scenarios\(^\text{[20]}\).
familiar in the social sciences. As a result, non-conventional and transformative possibilities are under-represented.\footnote{The epistemological divide between the predictive and non-predictive methods has been explored in the debate about modal and non-modal statements \cite{7,22,23}. Also, Karl Popper in his critique of historicism points to the importance of grasping the possibility of “changes in the conditions of change” \cite{9}. While Douglas North points out that conventional social science does a poor job with the non-ergodic \cite{24}, Kenneth Boulding points out that evolutionary systems have changing parameters and are, therefore, impossible to predict \cite{25}. Ilya Prigogine argues that “the future is no longer determined by the present … Mankind is at a turning point, the beginning of a new rationality in which science is no longer identified with certitude and probability with ignorance” \cite{8}.} Second, as already noted, it is more difficult to push the frontiers of the imaginable in actionable (policy choice) ways when the methods used for specifying the scenario variables, usually a structured conversation among pertinent constituencies, are rarely rooted in explicit, rigorous\footnote{Use of the term “rigour” may seem value-laden, but the intention here is simply to distinguish between stories based on explicit theories of a system (static or dynamic) that are the bread and butter of social science (hypothesis testing) and stories that do not spell out the underlying models relying instead on ad hoc impressions, untheorised expectations, or, in the case of views pooled from “experts” (often called a Delphi exercise), a grab bag of theories that have not been tested for commensurability or compatibility. I am not arguing that the former will be more accurate in “predicting the future” than the latter. In my view, neither is adequate to that task because long-run prediction of social systems is not only impossible, but a breach of the contingency principle that is fundamental to notions of “free will” and “creating the future”.} analytical-systemic frameworks.

Third, the virtue of distinguishing scenarios using either values or expectations turns into a vice when the objective is to imagine a set of equally preferable (isovalue) or equally probable (isoprobable) outcomes or paths for achieving the same outcome. GBU and Bear scenarios, within respective spheres, are inherently different, not equal, when it comes to values and expectations. That is what distinguishes one scenario from another. But, as a result, it is more difficult to generate equally desirable scenarios (isovalue) that can be used to analyse different ways of getting to similar goals or equally likely scenarios (isoprobable) that can facilitate choosing from amongst outcomes that reflect different values. This drawback of FS generated using GBU and Bear methods is a significant handicap for decision makers who are often called upon to make choices between equally desirable or equally (un)likely futures.

To be clear, the weaknesses identified here are neither due to the nature of these scenarios as evocative stories about the future nor the utility of using expectations and/or preferences to develop such narratives. The problem is that an exclusive reliance on predictive and/or value-based FS results in an incomplete and, hence, inadequate interrogation of the potential of the present. Evidence of this poverty of invention, narrow repetitiveness of findings and modest utility, in terms of an impact on strategic decision-making, can be found, for instance, in much of the scenario work done in the education sector, be it on the future of universities \cite{26} or of schooling \cite{27,28}. The scenarios that predominate are generally the product of single iteration\footnote{Two different aspects of the distinction between single and multiple iteration scenarios are pertinent here. The first, more substantive distinction refers to the contrast between sets of scenarios derived, through more or less intricate processes, using one basic methodology and other scenarios that are produced by generating a series of scenario sets with each set developed using a different method. The “hybrid strategic scenario” (HSS) method explained below is just one example of a multi-step, multi-method scenario development process. The second, less important dimension has to do with the number of iterations of the processes associated with a single scenario method.} GBU and Bear exercises,
sometimes mixed together to produce composite scenario matrices [29]. Similar drawbacks have been noted with respect to many technology foresight initiatives [30]. Without calling into question the positive outcomes of these efforts for teamwork and leadership, this type of exercise has generally failed to produce analytically persuasive or actionable conclusions for policy, particularly policies intended to take into account transformative societal change [19].

There is another, less remarked danger that arises from an uncritical reliance on GBU/Bear methods for selecting stories about the future: it is the difficulty of determining which methods are most appropriate for particular tasks. Existing typologies of scenario activities are largely inductive, arriving at the categories by reviewing existing practices differentiated on the basis of the scenario process or goal [18]. A more deductive approach, moving from general assumptions like the modal attributes of a futures studies methodology I have called “history of the future” [31], can generate a capacity-related typology that treats storytelling about the future as a capability or capacity that can be more or less sophisticated. Taking the capacity point-of-view for constructing a typology gives rise to what I call a “Futures literacy” (FL)\textsuperscript{14} framework for categorising thinking about the future.

2. A hybrid strategic scenario method for developing FL

FL is the capacity to explore the potential of the present to give rise to the future. Like language literacy, FL is a variable or cumulative capacity that can be used for many purposes, “good” and “bad”. One level is not “better” than another, but Level 1 is a precondition for Level 2, and Level 2 is a precondition for Level 3. This is no different than reading. Learning the alphabet is the first step in acquiring the capacity to decipher text, and then being able to read is crucial for beginning to decipher the messages contained in a text. Again, like reading, FL is not the same as the text that is being read or producing a text to be read. Certainly, the capacity to read a text, in its many senses, can be improved through practice, including writing text. But FL is not “the future”; it is the capacity to think about the potential of the present to give rise to the future by developing and interpreting stories about possible, probable and desirable futures.

One way of learning and practicing FL is to take a hybrid and sequential approach. The hybrid method is used because the only way to ensure congruency between scenario techniques and tasks is to use a range of different approaches. The sequential method is used because getting to Level 3 FL requires the capacities and knowledge acquired at Levels 1 and 2. The hybrid strategic scenario (HSS) method developed here, in keeping with the cumulative nature of FL, involves working through and acquiring the skills associated with all three levels of FL as summarised in Table 2.

2.1. Level 1 FL: awareness

Level 1 FL is largely about developing temporal and situational awareness—meaning a greater appreciation that change happens over time and that particular constituencies, products or organisations can be situated in time according to their values and expectations [14–16]. By revealing common goals and shared assumptions, the typically

\textsuperscript{14}The term “futures literacy” has deep roots in futures studies as a field, see for instance [6,32].
discursive group processes used to develop Level 1 FL help forge stronger teams and build the kind of confidence needed to make decisions about the future. Much applied foresight is practiced at this level and has an admirably successful track record at improving team and leadership capacities [21,27]. Bear/GBU scenarios, and particularly the learning processes used to generate them, are highly effective at developing the awareness that change happens over time, that people do harbour expectations and values, and that choices might matter.

Techniques for building Level 1 FL are legion and, in most cases, do not require a very elaborate catalyst to get the process going. People are primed to express their views about the kind of future they prefer and expect. However, the ease with which dinner table or workshop conversations carry through to the construction of more elaborate scenarios can be deceptive. While it is one thing to discuss expectations and preferences, it is another to weave them into a convincing story. Equally difficult, as teachers know, is to engage in a learning process that develops and embeds new capacities. Meeting both of these challenges calls for careful elaboration of the scenario process, following the rules of good pedagogy and storytelling. Leaving aside the issue, dealt with extensively in many different fields including future studies [32] of how to design an effective learning process, the issue of narrative structure or the rules of storytelling when it comes to FS merits a brief

<table>
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<th>Futures literacy</th>
<th>Task</th>
<th>Technique(s)</th>
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<tr>
<td>Level 1 awareness</td>
<td>Temporal awareness, shifting both values and expectations from tacit to explicit—all of which builds the capacity of people, teams and leaders to respond and innovate</td>
<td>A wide range of catalysts and processes generate the discussions and sharing of stories that elicit people’s views on what they want and expect in the future.</td>
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<tr>
<td>Level 2 discovery</td>
<td>Rigorous Imagining (RI) involves two distinct challenges—imagination and rigour, the former in order to push the boundaries and the latter so that what is imagined is “scientific” and intelligible</td>
<td>Escaping from the probable and preferable to imagine the possible demands systematic creativity and creating systematically, non-discursive reflection and social science are essential ingredients.</td>
</tr>
<tr>
<td>Level 3 choice</td>
<td>Strategic scenarios are aimed at questioning the assumptions used to make decisions in the present, not as targets to plan-by but to provide new insights into the potential of the current world as a way to embrace complexity, heterogeneity and the pertinence of spontaneous actions that put values into practice</td>
<td>Strategic scenarios are constructed using the capacities and stories acquired in developing Levels 1 and 2 FL, by combining values, expectations and possibilities into scenarios that follow the narrative rules (see Level 1 FL below) and the methods of “history of the future” [31].</td>
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See footnotes 2 and 12.
discussion. At a minimum because it is an aspect of scenario works that is often overlooked.

The narrative of FS, like familiar “artistic fiction”, is more intelligible and, hopefully, meaningful if it follows certain rules. In particular, it is important to be clear about the following five attributes of the story:

(i) What is the type or purpose of the story? Not tragedy or comedy, thriller or romance; but is it for contingency planning, simulation training, team building, optimisation testing or strategic imagining?

(ii) What is the temporal or chronological frame? Not beginning, middle and end; but comparative static (two or more cross-sections), dynamic trajectory (time-series) or back-casting (reverse engineered)? And, in practice, what is the time-span under consideration (years, decades, generations)?16

(iii) What is the (analytical) point-of-view? Not first or third person, stream-of-consciousness or dialogue; but is the story told in terms of the choices people make in their everyday lives (micro), or does it describe aggregate outcomes (macro) or is it about both (linking micro and macro)?

(iv) What are the main protagonists (ultimate decision makers)?17 Not hero and villain; but is the agent using the scenario to assist with making choices at a specific institution (firm, school, hospital, etc.) or about a social/economic system (nation, sector, etc.)? And what are the relationships between the agents as decision makers? Not parent/child or detective/criminal; but is the story of a specific agent like a school or a financial market stand-alone, told in terms of its internal functioning only, or is it embedded and interacting with a story of surrounding societal changes in production, consumption, uses of technology, social status, codes of conduct, etc.?

(v) What rules apply to the action? Not is time travel allowed or Matrix (the film) like suspension of the rules of this Universe’s physics; but what are the assumptions and hypotheses that underpin the analytical definitions and causal relationships that make for robust social science?

Explicit answers to these five questions go a long way towards ensuring that scenarios tell an internally consistent story. Helping both the teller and listener to grasp how time, values and expectations shape our understanding of the potential of the present.

The easiest way to clarify what distinguishes the different levels may be to provide an illustrative example using a what-if exercise. In this case the what-if exercise is: what if there had been an HSS process undertaken in the late 19th century with the aim of thinking about the future of the new and exciting technology of electricity. Imagine that it is the late 19th century, that electricity is in its infancy and that a group of futures oriented thinkers from the private and public sectors get together to assess the prospects for this new technology. As they discuss its potential, they realise that the stories they are telling are very open ended, not only because it is difficult to envisage how the technology will be

16From a strictly logical point of view, everything that is not the present is unknowable, and in so far as FS are not about prediction but imagination, the actual time-frame is beside the point. However, the time-frame does have an impact on the fifth point about the rules of action. Usually, over longer time periods, more parameters become open, thereby reducing the number and potentially the importance of the “framing” assumptions.

17Often the protagonist, naturally in the “starring role”, is the client or interested party that sponsored or undertook the HSS process.
used, but also because industrialisation and globalisation are in full swing. As they refine the stories about the future of electricity, they share specific values about access to technology, the role of technology in society and the political principles they believe should underpin decision-making—who and how to decide.

In the end, they produce a set of GBU scenarios. In the “good” scenario, electricity is used to build much bigger factories than was possible with steam or water power and to illuminate the bigger cities that accompany bigger factories. In the “bad” scenario, electricity turns out to be too expensive and dangerous to play a really major role, while in the muddling through “ugly” scenario, a bit of both the good and the bad lead to a reduced but still important role of electricity in the “factory era”. Of course, it would have been very difficult to anticipate that electric motors would become so small and mobile or that power generation could be so effectively centralised and distributed. The predictive capacity of these fictitious futurists is, as expected from a modal perspective, very low. However, in terms of Level 1 FL goals, the process has achieved its key targets. The group has rendered explicit a number of values and expectations. They have discovered elements of a “common language” for talking about change, and they have probably made considerable progress in defining the subject—the potential role of electricity in society—more clearly. However, even the best Level 1 FL stories suffer from the limitations discussed previously. Level 2 FL or “rigorous imagining” is one approach to overcoming the pitfalls of Level 1 FL.

2.2. Level 2 FL: discovery

Level 2 FL is the capacity to overcome the limitations imposed by values and expectations when thinking about the future. It is a technique for conducting the potentially paradoxical task of “rigorous imagining”. This is a crucial and challenging step in opening up new insights into the nature and determinants of today’s potential. Rigorous imagining depends on carefully and consistently distinguishing between possible, probable and preferable. Such distinctions are necessary for rigorous imagining because the task of imagining possible futures is logically and practically prior to the assessment of probabilities and preferences. It is prior to the assessment from a logical perspective because, as illustrated in Fig. 1, preferable and probable futures are subsets of the possible, and prior to the assessment from a practical perspective because as already pointed out, consideration of preferences and probabilities constrain the imagining of possibilities.18

Starting with the logical, a useful first step in expanding the range and analytical content of possible futures is to clarify, at a conceptual level, what distinguishes conceivable, possible, probable and desirable scenarios. Fig. 1 is an illustration of one way of defining these categories and the logical inter-relations. The largest set consists of conceivable scenarios (Zone 0). A sub-set of conceivable futures are those that are possible (Zone 1). Nested within the set of possibilities are probable futures (Zone 2) and some of the desirable ones (Zone 3).19 There are, of course, desirable futures that are neither

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18Note that this does not mean skipping Level 1 FL because a basic understanding of contingency and an awareness of current assumptions (values and expectations) is crucial for overall FL. However, Level 2 FL does require a break with Level 1 FL because the point is to at least make explicit current assumptions if not to begin to discover what it means to develop alternatives.

19As desirability is in the eye of the beholder, this set contains both good and bad scenarios; it depends on your point of view.
probable nor possible, even if conceivable. Hence Zone 3 spills over from Zone 2 into Zones 1 and 0.\textsuperscript{20}

Describing, as in Fig. 1, the infinite number of stories that make up the whole scenario space, does not in-and-of-itself solve the problem of how to choose specific stories from within that space. As already discussed, GBU/Bear methods offer one way of identifying the variables and selecting scenarios (Zone 4), but in ways that are limited by the pursuit of scenarios based on values and/or probabilities. The challenge then is, in most cases, to use non-predictive, value neutral methods to identify both the variables and the scenarios that are possible (Zone 5).

Rigorous imagining can be conducted in a multitude of different ways. However, it is one of the distinguishing features of Level 2 FL that many of its story selection methods are incompatible with those of Level 1 FL. The definitional differences are obvious as discovering what is possible (minimally probable) is not the same as determining what is likely (more than minimally probable) or desirable. The practical differences arise from the nature of the competences entailed by different levels of FL. Level 1 FL largely involves shifting knowledge from its tacit to explicit form, i.e., what people already know about time, preferences and expectations. The pedagogy for achieving Level 1 FL calls for structured learning processes that help reveal to people their existing assumptions.

\textsuperscript{20}There are possible and probable scenarios that are not conceivable. However, using the criterion of practicality, I have limited the conceptual space to those that are conceivable [23]. Furthermore, I have nested desirable mostly within probable as there is likely to be more interest in scenarios that are both probable and desirable. This is not meant to imply, a priori, that there are necessarily fewer desirable than probable scenarios (both sets are infinite from a modal point-of-view and given sufficiently fine gradations of differentiation and long enough time-spans). The opposite might hold good, with the set of desirable being larger than the set of probable, but as the point is to expand the set of choice relevant scenarios, it is, in any case, only the overlap that is of interest in the end.
By way of contrast, discovery of the unknown (knowledge that is neither tacit nor explicit but must be discovered) and the application of the methods that combine creativity and social science to the task of discovery usually do not involve the same methods or competences as Level 1 FL. Certainly, both Level 1 and 2 FL entail learning processes and, as such, share the principles of good pedagogy. However, in practice, the discursive exposure of underlying expectations and values that works so well for developing Level 1 FL is in marked contrast to the much more reflective (often non-discursive) processes of analytical refinement involved in Level 2 FL.

Without making any implausible claims to value and expectation neutrality, as our basic interpretive structures are built upon values and expectations, the methods selected to conduct Level 2 FL exercises must be at once amenable to extra-systemic/non-extrapolative inquiry and wielded in ways that invite extra-systemic/non-extrapolative imagination. In other words, the aim is to develop a model that has the most open set of parameters or permutations for telling stories about the future (i.e., increasing the coverage of Zone 5). The challenge is to develop a “space” for imagining possible futures. As with any canvas or map, there are rules and conventions, rooted in specific “ways” of seeing the world that circumscribe what is painted or projected into the frame. It is important to make these explicit, as per point five (v) of the narrative rules outlined above. However, it is equally important to justify, using theories and hypotheses, the selection of the variables that describe the “possibility space.” Thinking of geography, it is obvious how even if the territory on a map is unexplored it can still be located using latitude and longitude. In a similar fashion a possibility space delimits, by setting out a coordinate zone, a range of possible “locations” for stories of the future.

Picking up the thread of the late 19th century FS exercise about electricity used above to exemplify Level 1 FL, here is a practical example of a four-step method for constructing a “possibility space” frame and then selecting specific points (scenarios) within that frame. This example is meant to illustrate the concept without, in any way, exhausting the many techniques for defining a possibility space. For the sake of brevity, there is no detailed discussion of the premises and theory underlying the specific variables.

**Step 1:** First, select a subject, in this case, continuing with a hypothetical exploration of the future of electricity in the late 19th century, the subject that emerges from the Level 1 discussions is the pervasiveness of electricity (variable A)—with pervasiveness defined in terms of how widely a technology is diffused (extent and diversity of use). When a technology is invented and then commercialised, its degree of eventual diffusion remains an open question. On the one hand, it is possible that it will not be picked up at all. Alternatively, it might become widely diffused, entering all aspects of life—from the workplace to the home.

**Step 2:** The second step is to develop a model, following the general precepts of social science, that defines the attributes (variables) of the selected subject, in this case the diffusion of electricity. Here, by way of example, the hypothesis is that the possibility of diffusion (note this is not probability of diffusion) increases in line with two of the key attributes of a technology: (a) how easy it is to use and (b) the number of different uses to

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21Such modelling steps are common to social science methods and in the scenario technique literature as well [6].
22In practice, Level 1 exercises can help with the selection and specification of the subject, even if the definitions and metrics produced by Level 1 processes usually require subsequent “rigorous imagining” to push the boundaries of the imaginable, using analytical refinement based on robust theories and models.
which it can be put [33]. Fig. 2 describes the two variable spaces and the arrow illustrates one hypothesised relationship (path) for a technology like electricity. As it becomes easier to use and is applied to more different uses, the possibility of pervasiveness increases from the lower left corner of the possibility space to the upper right.

Crucially, the probability of arriving at any particular point in this space remains undetermined. No probabilities are attached to any particular point. As a result, possibility spaces help to open up the field of points (outcome scenarios) and trajectories for getting to the outcomes (path scenarios). It is one way of being systematic and explicit about the hypothetical “what if”. Forecasters also take this type of approach. Only their efforts, including the theories and variables selected, focus on prediction and usually work within the constraints of what is practically quantifiable.\(^\text{23}\) The aim of a possibility space analysis is to get beyond the predictive imperative by applying many of the same modelling techniques to the challenge of expanding the set of possibilities for both building and mapping scenarios.

This approach helps to overcome two drawbacks that often render scenarios less useful for strategic purposes. First, this technique is careful to focus on Zone 1 (possibility) prior to working on Zones 2 (probability) and 3 (desirability). This is critically important from a strategic point-of-view because it provides a broader canvas (Zone 5) for imagining both

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\(^{23}\)It is not the empirical testing that makes predictive forecasting models less appropriate to thinking about possibilities. Rather, it is simply that the objective is usually to find a model that provides a good “fit” with past data and on that basis offer probabilistic predictions about the future. Rarely is the aim to explore potential, particularly “non-ergodic” change, as D. North points out [24]. By way of contrast, the goal here is not to forecast (predict with any degree of probability) but to expand the range of potential scenarios (imaginable stories) based on a more open framework for describing what may be possible. Hence the lack of quantification—at least initially—is not only a virtue (it opens up potential) but in the case of transformative change a necessity, as the categories of future quantification have not even been defined yet. Once the possibilities have been rigorously explored, modelling based on quantitative and qualitative estimates of variables can be an important tool for deepening the analysis of the factors that might influence rates and directions of change (for instance, see the “radar chart”, p. 21 in [11], which is an example of metrics for a possibility space scenario of the learning intensive society).
the ends (goals for the future—Zone 3) and means (how to get there—Zone 2). This facilitates efforts to articulate the emergent nature of the future. Second, a key tool for pushing the imagination is the use of the analytical apparatus and findings of social science. Not only do these hypotheses and models often (although not always) make it easier to push the envelope of what is imaginable, even to the point that some possibility space scenarios range outside Zone 1, but in addition, because the definitions and frameworks abide by basic rules of social science, it is easier to connect an analysis of the conditions for the realisation of particular scenarios to the assumptions about behavior, institutions and power that shape current choices (action/policy).

**Step 3:** Having enlarged the set of possible futures for consideration when developing scenarios, the third step is to select specific scenarios from what is still a vast space of possibilities. The question is how? The criteria for selecting the scenarios will depend, in large part, on the type of story (as per the narrative rules above) and the specific subject. Of course, there are the Bear and GBU approaches that could be applied immediately to the broader set of possibilities. These extrapolation and/or preference-based perspectives can be used to make a selection from within the larger possibility space, either by taking the starting point and rates of change as givens or by imposing a specific set of values for differentiating end-points. However, once again, the use of values and predictive parameters runs the risk of pre-empting imaginative and emergent options.

A more neutral and open-ended way of selecting scenarios from within the “possibility space” frame is to focus on the functions and/or organisational attributes of the scenarios’ subject setting aside, for the moment and once again, the questions of probability and desirability. This approach to selecting scenarios, which is just one among many, has the particular advantage of translating fairly directly into the functionalist/organisational requirements of much decision-making, i.e., decisions that aim at achieving a certain functional outcome (a specific product or end result such as an “educated” population), using a particular form or organisation (like a factory or a school).

Continuing with the example of electricity, imagine that electricity is a technology that has not yet traced its path across time (in formal terms a “counter-factual” scenario). From this pre-electrical vantage point, imagine three hypothetical functions and two basic organisational patterns that can be used to develop the counter-factual scenarios for electricity: weapon (tool of war); local replacement for steam and water power in factories; and autonomous source of power for all kinds of consumer products (most of which have not been invented yet). Out of many possible ways of organising electrical power generation, the two most contrasted options are: centralised and decentralised. These three functions and two organisational options generate the six scenarios in Table 3.

**Step 4:** The next step is to take the six scenarios in Table 3 and project them back onto the possibility space as per the mapping in Fig. 3. Obviously, the location of a particular scenario within the possibility space is determined by how that scenario relates to variables (a) and (b). Again, for the sake of illustration and without the in-depth analysis needed for defining metrics and justifying the situation of the variables, scenarios S2, S4 and S6 are...
mapped higher on the grounds that decentralised generation implies that technical barriers to use have been reduced—hence these scenarios score higher on ease-of-use. While scenarios S4, S5 and S6 are deemed to exhibit a wider range of uses because, as a decentralised tool for industry (S4) and a general tool for consumers (S5, S6), electricity is assumed to be used in many different ways. In S1, where electricity is held exclusively by the military as a specialised weapon dependent on the centralised generation of power, there is little need to develop ease-of-use, while the range of uses is very narrow. Hence, S1 is in the lower left of the possibility space.

None of these scenarios can be considered strategic (informative for making choices) as they only map function/form scenarios onto a technology pervasiveness possibility space. Of course, we know that electricity ended up covering all three functions and, despite the recent appearance of somewhat simpler and more efficient techniques for decentralised power generation, the ease-of-use (and cost) problem was largely solved through centralised provision of electric current. Getting to strategic scenarios, as illustrated in Fig. 1, involves reconnecting with probabilities and preferences or Level 3 FL.

2.3. Level 3 LS: choice

Level 3 FL, building on the rigorously imagined scenarios of Level 2 FL, uses values and expectations to assess today’s choices. Level 3 FL integrates the insights of the two previous levels. From Level 1, it takes an awareness of values and expectations. From
Level 2 FL it takes the discoveries of “rigorous imagining”. The Level 1 values are crucial for selecting between different scenarios in order to designate one (or an isovalue set) as the strategic goal(s). Expectations are also a key ingredient for Level 3 FL because the likelihood of making the decisions that matter for the strategic goal will depend, in large part, on the expectational landscape. Level 2 imagination is crucial because it takes the assessment of the present beyond the constraints of what is considered “realistic” (for instance, the “I don’t dare hope for” or “it can’t be measured” that so often truncates Level 1 thinking). Rigour is also critical because the analytically sound attributes of Level 2 scenarios means that the conditions for change are presented in decision relevant terms. Level 3 FL builds on all of this capacity to think about the potential of the present and provides the link to action.

Once again, an illustration may help. Continuing with the counter factual scenarios for electricity, assume that the desired goal (the preferred scenario), as articulated for instance by elected politicians, is to make electricity as pervasive as possible (a bit like information technology today). This means that the policy challenge calls for an analysis of what it would take to get to the upper-right of the possibility space (Fig. 2). Decision makers would seek answers to a series of discipline spanning questions such as: What are the best technical estimates that this is plausible? How practical are decentralised forms of electrical generation such as, at that time, mini-water wheels, batteries, wind, solar? What are the obstacles, in terms of people’s know-how, risk factors, cost, etc.? Can ease-of-use be expected to improve dramatically without generating much higher costs (training, new user-interfaces, etc.) How serious are the entrenched interests blocking certain decisions and facilitating others?

Looking back, we now know from the history of electricity that some of the decisions that locked in the form and function (the history) of electricity’s development were explicit, but that many were not [33]. At a certain point, the path dependency or the cost of changing course (technically, financially and from the point-of-view of overcoming political obstacles) became very high [34]. Most of the decisive moves that led to the lock-in of the centralised model were taken without any real awareness of the (what-if) roads not taken. Historians now debate whether, at the time, there was either the will or the way to explore the technological, economic and social possibilities—scenarios of plausible alternative configurations [35]. Indeed were the terms (language), workplace tools and methods and consumer goods and living patterns of ubiquitous electricity even imaginable? Strikingly, much the same question can be posed today regarding the future of energy or information technology or of the tertiary education sector.

To go into a little more practical detail, Level 3 FL involves four basic (and familiar) steps:

(i) **Strategic Goal**: First the possibility space scenarios that are part of Level 2 FL need to be looked at in normative terms. What is good or bad about these rigorously imagined scenarios? Which one is preferred in a specific context? For instance there are many different types of mixed economy and modern welfare state that across the developed nations today—different ways of achieving similar outcomes that reflect the values and history of each nation. Which one of these many different ways of achieving the same degree of well-being is preferred even if, from a Pareto Optimal view, all of the scenarios display equal levels of “well-being” or satisfaction (with the winners from change compensating losers)? Here it is very useful to be able to reintroduce the values
made explicit during the process of developing the Level 1 scenarios (note it is the specification of values that is useful, not the Level 1 scenarios which have, by this stage, been discarded).

(ii) **Strategic Choices**: The second step analyses the similarities and differences between the selected story of the future and the story we tell about the present. The aim is to identify the choices that are both “structurally” and “dynamically” critical (i.e. without this particular change or continuity, the structure and/or the dynamics do not hold together (work, function)). How consistent or inconsistent are the choices that underlie the strategic scenario with current decisions?

(iii) **Strategic Probability**: The third step, in light of the second, is to consider the probability that the requisite decisions will be made. Given current expectations (political positions, social conventions, attitudes, etc.), is it likely that the enabling changes will occur? What do decision-making models, historical analyses and political science tell about the play of power and conflict, inertia and volition when it comes to the strategic choices?

(iv) Finally, the fourth step is to act on the basis of the strategic insights acquired in the previous steps. Such an expectation may be too rationalistic, and in any case, will depend greatly on the context. Still, the fundamental point of FL, and of the effort required to identify scenarios that are at once possible, probable and desirable, is to influence the choices people make. This last step is not at all self-evident. For futurists, and also those who yearn for prediction, it is worth remembering the recent and tragic example of predictions not heeded: the inundation of the city of New Orleans. Predictive or non-predictive, a scenario is only a decision-making tool. Tools are not always used, and neither are they always used for the ends the designers intended.

The role of FL and the HSS method for acquiring and practicing FL is an open one. By way of a brief conclusion, I want to explore two opposing uses: planning versus spontaneity.

### 3. Conclusion

The conception of education as a social process and function has no definite meaning until we define the kind of society we have in mind.

John Dewey, Democracy and Education, 1915 [36].

Level 3 FL makes it easier to put current choices into strategic context in two ways. First, more conventionally, it helps decision makers to question current goals in explicit, actionable terms by drawing clear contrasts between the assumptions and content of the present policy and the outcomes and preconditions of the strategic scenarios. Are the goals the same? Are the functional relationships that make the scenarios plausible the same?

25At this stage, to keep the presentation simple, no distinction is made between comparative static (outcome) and dynamic (path) scenarios. In practice, this distinction is crucial and thus the notion of structurally and dynamically critical needs to be looked at in two ways—one for the structure of change and one for the structure of systemic coherence. And then in terms of the relationship between the two, in particular in the context of what I call “spontaneous society”, where putting values into practice through spontaneous decision-making is what determines the indeterminate future.
What has changed to turn the potential into an operational, more practically realisable vision? How dependent (contingent) are the changes depicted in the strategic scenarios on changes in current policy and/or on new policy and/or on changes in underlying values, individual and collective capacities, institutions, laws, cultural norms, etc. [44,45]?

Second, less contiguous with past practices, Level 3 FL may be one of the necessary (although not sufficient) conditions for the emergence of a post-industrial society. In such a society, if FL becomes quasi-universal like linguistic literacy today, then that society may be capable of continuously exploring both the micro (individual) and macro (collective) requirements for realising the potential of the present. This is more fundamental than it might appear because building up this capacity may address one of the primary unresolved problems with post-hierarchical governance (i.e. fuller democracy): how to reconcile bottom-up local desires and power with top-down preferences and power? [50]. Or, framed in terms of complex adaptive systems theory, if FL is an attribute of post-industrial society, then it may help to improve the chances that the path taken by “blind” evolutionary processes is both consistent with people’s aspirations and makes the most of the potential for innovation [37].

In this way, the strategic scenarios that are central to Level 3 FL offer a solution to two critical “flaws” of non-hierarchical, complex self-organising systems: the non-teleological nature of such evolution and the non-systematic discovery of potential for innovation or alternative solutions. Society-wide acquisition of FL might provide a response to these two deficiencies of evolutionary systems by creating the capacity, in the context of the type of post-industrial society assumed at the outset of this article, to detect and engage the potential of the present in four critical areas. First society-wide FL would help to equip a society to embrace much greater dynamism (birth, death, entry, exit) and complexity (multi-level, multi-purpose) of networking. In this context FL equips people and communities (interest, practice) with an ability to invent and tell stories that can ascertain, initiate and sustain the requisite common standards for network functioning. Second FL develops an explicitness of values in practice that can turn spontaneous choices into the realisation of our aspirations (without actually being able to know, project or want to impose such aspirations on future generations). Third FL is a way of using the contingency of outcomes (indeterminacy and volition) to shape/inform choices at the level of individual and collective behaviour, rules, etc., in ways that embrace the ambiguity and complexity of reality. And fourth, FL addresses the non-systematic aspect of blind evolution because it offers a systematic examination of the opportunities (rigorously imagining the potential of the present) and the need for innovation, where breakthroughs are waiting to happen and where breakthroughs need to happen.

Level 3 FL shares many attributes of “strategic planning” without, however, becoming a quest for predictive fulfillment. This may seem a small nuance and, if the opening assumption regarding transition scale change turns out to be false, a largely irrelevant one. But in order for FL to be effective in the context of a post-industrial “spontaneous society”, then it must remain resolutely non-predictive as well as strictly choice contingent. The non-predictive requirement stems from four basic attributes of a...
spontaneous learning intensive society: (i) heterogeneity, (ii) complexity, (iii) fluidity, and (iv) spontaneity [13,31,42]. Under these conditions, prediction is a violation of principle. There is neither a way nor add reference is there any need to know what will happen (what people will want, do, have or think in the future). What does matter is recognition of how choice contingent the future is and, hence, why decisions made now needs to grasp, to the fullest, the possibilities of the present (i.e. be futures literate).

Strictly speaking, there is no reason to violate the principle of “non-prediction” when making choices meant to change what happens in the future. Everyone accepts the self-evident proposition that the future is the outcome of a series of decisions that were always made in the present, the here and now. The past time of human society stretches out behind us in a long string of decisions (made or not made) and the future-time in a string of decisions to be made. Following the logic of this “modal” assumption, there is no necessary reason to impose predictive expectations on the choices made today as such choices may or may not be followed by consistent or inconsistent choices tomorrow. Furthermore, if a choice is made tomorrow that is inconsistent or in outright opposition to the one made today, that is (according to one set of values) the prerogative of those making the choices in the future.

A slight pause on this point is useful because it runs contrary to one of today’s “common sense” principles enunciated by many and, perhaps most familiar, from Gro Harlem Brundtland’s 1987 Report: Our Common Future, that defined sustainable development “as development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” Inherent in this principle is the belief that today’s generations are in a position to determine what will or will not compromise the ability of future generations to meet their own needs. In one interpretation, a common one in the literature, this rests on a very strong predictive assumption regarding not only the capacities but also the values of future generations. An assumption that is usually left implicit.

Thinking about the relationship of the values past to values present, there are few who would say that my choices today should be based on the assumptions made by my grandparents about women’s role in society, about the filial duties of the son, about the way to ensure a livelihood, about the importance of the nation, about authority or democracy. Yet my grandparents may have made choices, not only to ensure their survival, but perhaps in their minds to perpetuate their way of seeing the world and living in it. As I sit here writing, I cannot begrudge them either their conservatism (preservationism) or their choices about how to survive in a fairly hostile context (early to mid-20th century). What I can do is seek a way to continue their commitment to freedom and responsibility by improving both my capacity and that of the society upon which I depend to put my values into practice, into day-to-day life, into the string of choices that turn the present into the future. It is also one of the profound criticisms of today’s world, one of the value based reasons for striving to change it, that it is very difficult to reconcile many of our

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27Claiming that it is possible to “know” what people will do or want (value) in the future runs contrary to both “history of the past” observations that the practices of daily life and values change over time, and the “history of the future” assumption that it is probable that life and values will continue to change in the future. There is no way to know what the content of those changes will be. Claiming that we want people in the future to have the same values and do the same things as us is another story entirely. Unfortunately, these two different propositions are often confused.
aspirations with both the choices we face and the terrible reality of our times. Advocating change is a moral imperative.

Which is precisely why FL, as a capacity, may be useful. FL embraces the profound unknowability and contingency of the future by developing the capacity to imagine and analyse the potential of the present in ways that are more consistent with our present values. FL is neither about predicting what will happen nor planning the path from A to B, but about improving the capacity to imagine and assess the potential of decisions made now to create a future by putting values into practice. By combining an openness to the potential of the future with a greater ability to invent stories that make sense of the present, FL produces strategic insight without prejudicing the autonomy of people in the future to see different options and hold different values. Still, FL is only a tool. And, like any tool, it can be used for “good” or for “bad”. Nor is the tool an end in itself.

Why, then, does FL matter? There is no way to know. What is clear, looking to the past, is that the implications of generalised language literacy ushered in by universal compulsory schooling, a hugely transformative initiative by any standard, made possible things that no one could have imagined. Champions of schooling argued that formal education was the only way to transmit and reproduce the workings of a complex society [36]. Is LS likely to be as critical a tool for the 21st century as language literacy was for the 19th and 20th centuries? Could futures literacy be a key enabler of a much more spontaneous, networked and learning intensive society? Is this a way to reconcile the power of complex adaptive systems with the aspirations of freedom and responsibility? The only way to find out is to do it.

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[47] The Millennium Project has produced a scenario bibliography with over 450 scenario sets available at <http://www.acunu.org/millennium/information.html> which are organized in the “Futures Matrix” in the following domains: Demographics and Human Resources; Environmental Change and Biodiversity; Technological Capacity; Governance and Conflict; International Economics and Wealth; Integration or Whole Futures.


