Scenario Building:
The 2x2 Matrix Technique

This collective scenario generation technique pairs the two drivers of the highest importance and the greatest uncertainty for the topic under study as axes creating a 2x2 matrix which forms the basis for possible scenarios. The 2x2 matrix approach is often used for testing medium- to long-term policy because it ensures that policy direction is robust within a range of environments. Group diversity, flexibility, and rapidity are other hallmarks of this technique.

APPLICATIONS SCOPE

The 2x2 matrix technique can be applied in any situation where scenarios are useful, whether as a stand-alone one-day exercise or part of a project lasting several months.

- **Domain**: all domains.
- **Number of participants**: any group of people, from 3 to over 100, can be engaged in a 2x2 scenario development exercise. The sessions work best with a diverse group bringing together a variety of expertise and experience.

RELEVANCE AND USE IN FORESIGHT

Used around the globe, the 2x2 matrix technique helps create scenario narratives. Its success may be explained by how easy it is to implement and generate highly contrasted scenarios in a short period of time.

However, the 2x2 matrix technique does present shortcomings. It does not explicitly take into account interaction between a large number of variables. Furthermore, because it focuses on key uncertainties, it does not integrate stable trends and gradual developments.

BASIC CHECKLIST

- Scope out the issue to be addressed as a subgroup or project team, undertake some research and horizon scanning of relevant factors and drivers of change prior to the workshop.
- Make sure your work is rigorous and systematic, and can be presented as robust so as to reassure clients or senior staff who may be nervous about the use of intuitive and qualitative methods.
- Ensure that drivers of change (particularly those chosen for the axes) are transformative forces not outcomes.
- Resist the temptation to ask consultants to develop scenarios for the group. The benefits of holding workshops with a diverse group of participants (experts, employees and external stakeholders) outweigh the disadvantages (time and cost).

TECHNICAL REQUIREMENTS

In most cases, no particular preparation is required. Participants bring their ideas, knowledge and experience. The usual workshop logistics are needed, *e.g.*, adequate space, basic office supplies (flipchart, marker, sticky notes), possibly simple audiovisual equipment.

TIME FRAME

Once the subject and working group have been determined, the 2x2 matrix technique requires only a few hours of group work. However, fleshing out the scenarios generated in the workshop(s) does require a significant number of hours/days per facilitator or leader.

TOOL IMPLEMENTATION COSTS

The main implementation cost will be the consultant's time spent on designing, preparing and facilitating the scenario-building sessions and drafting the scenarios based on the material generated. He or she will need at least one assistant/note-taker, and additional support if more than 30 people are involved in the workshops.

For a simple 2x2 matrix project, one to three workshops of approx. 6 hours each should be budgeted with venue and catering included.

Research and horizon scanning, if not already undertaken, will need to be carried out prior to the workshop sessions.

Scenario Building: The 2x2 Matrix Technique

by Alun Rhydderch*

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Abstract

In the 2x2 matrix technique, scenarios are narratives describing how things might be by a medium- to long-term time horizon, *e.g.,* 2025 or 2050. As such, they explore how the world would change, should certain trends emerge and particular events occur. Usually a set of two to five scenarios is developed so as to represent different possible futures associated with a number of trends and events.

This method generates up to four contrasted scenarios relevant to a particular area of interest (geographic or thematic) by placing two factors that influence the future of the issue under study on two axes which cross to form four quadrants (see Figure 1).

FIGURE 1. A SAMPLE SCENARIO MATRIX

More government

Scenario 1   Scenario 2

Weak economy ←——————————→ Strong economy

Scenario 3   Scenario 4

Less government

Factor 1: Strength of economy
Factor 2: Governance

Source: author.
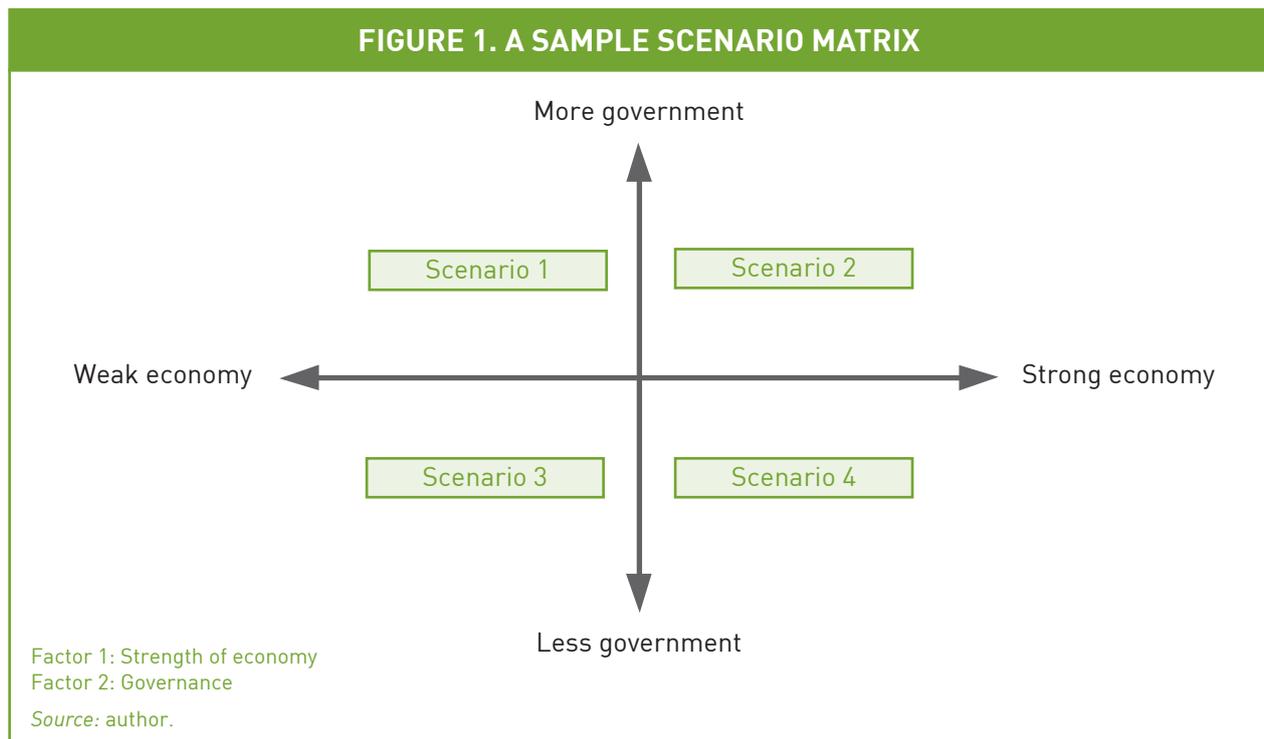
The factors chosen for the axes should be "high-impact, high-uncertainty". This choice ensures that the parameters of the four spaces defined by their intersection are clearly differentiated. These quadrants may then be developed into scenario narratives, reflecting the influence of previously identified events, trends, and drivers of change, in addition to those already represented on the two axes.

The 2x2 approach was formalized during the 1990s by the consulting firm Global Business Network (GBN). Not surprisingly, many of GBN's members had previously worked at Shell, where much of today's scenario practice was pioneered. In 1996, an account of the 2x2 approach was published under the heading "Steps to Developing Scenarios" as an appendix to Peter Schwartz's bestseller, *The Art of the Long View*.

Keywords

Scenario ❙ Two axes ❙ STEEP ❙ Global Business Network (GBN) ❙ Shell ❙ Peter Schwartz

The method is well suited to presenting a rich account of multiple, overlapping and interacting facets of a potential future. The method is often used for testing medium- to long-term policy because it ensures that policy direction is robust within a range of environments. Scenarios developed using this method tend to look 10 to 20 years ahead.

When done well, the set of scenarios generated can be highly persuasive, even to a non-specialist audience. Ideally, workshop participants should include people familiar with relevant evidence and analysis to ensure that the scenarios are credible. The final scenarios should be reviewed for coherence and internal consistency.

Although sometimes criticized, notably for reducing the variety of drivers of change to two dimensions (axes), this approach remains widely used in all sectors, as it effectively marries the analytical element with "space" to expand the drivers and develop scenarios that incorporate both qualitative and quantitative elements. ■

Description

The 2x2 scenario method may be applied in any situation calling for scenarios, whether as a stand-alone, one-day exercise or part of a project lasting several months. In fact, the method's flexibility helps explain its popularity.

Any group of people, from 3 to over 100, can be engaged in a 2x2 scenario building exercise. The session(s) do, however, work best with a diverse group combining a variety of expertise and experience. If the scenario-building sessions are held inside an organization, a mix of departments and geographical regions is highly recommended. Indeed, people from outside the organization should also be invited to attend (experts, customers, suppliers, other stakeholders), whenever possible.

The exercise should be led by someone with experience using the method. Support from one facilitator or more is needed once the number of people involved in the exercise exceeds 20.

Although some background reading may be helpful, participants require no particular preparation; instead, they are asked to bring their ideas, knowledge and experience.

The session leader will often use a flipchart and felt marker to explain the method. The group may benefit from an audiovisual presentation with some introductory slides, but this is not mandatory.

In a typical session, tables are set up cabaret-style, with each one seating from three to ten people. Experience shows that tables of six work well. Ideally these tables are spread out in a large, airy, well-lit room. If one spacious room is not available, the use of several small "break-out" rooms should be considered. Keep in mind that discussion may become animated throughout the day and can actually disturb group work.

Before meeting in a plenary session, it is important to clarify the purpose of the project in which the scenarios are one element. Everyone should agree on how the scenarios will be used to meet the objectives or further the goals of this project. Interviewing those who commissioned the work plus other stakeholders can prove very useful in the scoping process. Overall, this preparatory process helps ensure that the commissioning team shares a clear idea of both what the work should achieve and how the scenarios will be used.

PRE-WORKSHOP ANALYSIS AND BACKGROUND MATERIAL

Prior to the scenario workshop, participants generally are not required to prepare; however, the project management team should have scoped out the issue to be addressed, done some research and scanned the horizon for relevant factors and drivers of change. The time and people needed for this will depend on the complexity and scale of the project. Ideally at least five person-days' preparatory work should be undertaken prior to the workshop.

This background research should be made available in a format easily accessed by workshop participants for use either before or during the workshop, *e.g.*, an introductory document or a short slide presentation shown during the initial session. ∎

TIME HORIZONS

There are no hard-and-fast rules about the appropriate time horizon for scenarios. Traditional scenario methods tend to look 10-20 years ahead and reflect the issue or question being examined. When the work focuses on more narrowly defined trends and drivers, *e.g.*, those linked to political situations such as elections, this horizon may be reduced to five, three or even fewer years. If scenarios are being used to test the robustness of a plan or strategy, one rule of thumb is that they should look ahead at least twice as far as the time frame of the plan. In other words, scenarios to test a 10-year plan would ideally look at least 20 years ahead.

Scenarios considering issues such as climate change will have a longer time horizon. The same applies to scenarios developed for sectors such as energy, where companies and governments need to make major investment decisions (as well as impact assessments, mitigation and adaptation measures), decades before new infrastructure and facilities are in place. ∎

Step-by-Step Application of the Method

◗ Step 1: Identify the Focal Issue or Decision

Ideally, the scoping activity undertaken with the commissioner of the scenario work (client) and other stakeholders will produce a clear and simple question plus a statement of what the work is supposed to achieve. The development of the scenarios then serves to address the question.

Without the above information, and without the time or authority to scope the work as described, the facilitator, practitioner or session leader must identify the focal issue or question at the start of the workshop. Here are three questions you can use:
- What issues are decision-makers in your organization grappling with?
- What decisions with a long-term influence on the organization must be made?
- Are there strategy or planning processes which would benefit from having a broader perspective on the future?

REMINDER

A clear, simple question in no way limits the scope for developing rich, imaginative scenarios. A clear, simple question reminds everyone involved that the exploration of possible futures must be relevant to that question and help provide an answer. ∎

Time spent defining the key issue to be addressed, coming up with one question or a short set of questions that the scenario work should answer, and running these ideas past the client is time well spent. Too many scenario exercises fail because the question addressed is not clearly defined.

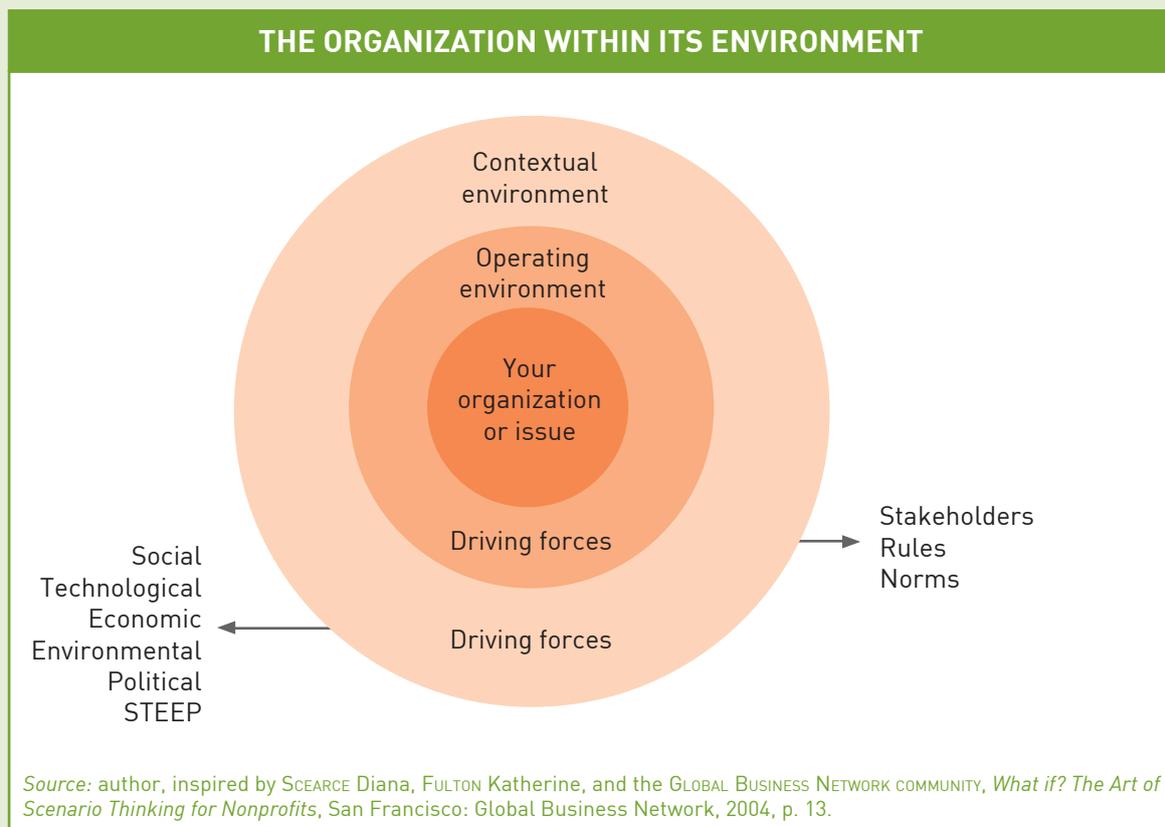Below is a short list of questions which could be addressed in a public sector scenario exercise:

- What will the future of country X/region Y look like in 10 years? (country/region analysis focus)

- What risks do we face in country Y over the next five years? What contingency plans should we put in place? (risk management focus)

- What strategy should organisation X adopt in order to achieve outcome Y? (strategy development focus)

- How robust is strategy X or program Y over a 10-year time frame (in the light of Z)? (strategy or program review focus)

- What should be the goal of organisation X and how should it be achieved over the next 15 years? (vision focus)

▶ **Step 2: Internal Dynamics**

OUTSIDE-IN THINKING

The graphic below illustrates the expression "outside-in thinking". Participants are invited to scan the environment outside their organization's walls and then zoom back in to think about the future.

THE ORGANIZATION WITHIN ITS ENVIRONMENT

Contextual environment

Operating environment

Your organization or issue

Driving forces

Driving forces

Stakeholders
Rules
Norms

Social
Technological
Economic
Environmental
Political
STEEP

Source: author, inspired by Scearce Diana, Fulton Katherine, and the Global Business Network community, *What if? The Art of Scenario Thinking for Nonprofits*, San Francisco: Global Business Network, 2004, p. 13.

The fundamental difference between scenario thinking and most strategic and planning approaches lies in the fact that participants use the scenario process to create pictures of the outside world (external, contextual environment) rather than the immediate operating environment of their organization. Through scenarios, they then consider how changes in this external environment may affect the organization, directly or indirectly.

Initially, the emphasis on *macro* trends and drivers of change may feel uncomfortable, because it appears to draw attention away from pressing concerns and critical business issues. However, emphasizing the long term and change compensates for people's tendency to focus on the short term and immediate environment. In any event, participants explore the *macro* space in the process, then return to critical issues while examining the implications of the scenarios and considering what actions are needed to handle or avoid the scenarios. ■

Note: Some people refer to the process of looking at the big picture before homing in on details as one of divergence, followed by convergence.

Once the key issue or question has been set out, workshop participants discuss the key internal dynamics influencing it. Discussion not only helps situate the issue within the business or operating environment but also establishes its importance. This contextualization sets up the next step, in which participants are asked to adopt a *macro* perspective while temporarily leaving behind their immediate business concerns.

The mnemonic **STEEP** stands for Social, Technological, Economic, Environmental, Political.

It is a broad categorization of external, *macro* domains affecting all organizations, large and small, public and private. When developing strategy, STEEP reminds participants to consider current or potential activities, trends and developments in all these domains — not just in the immediate environment. Participants reflect on how these activities, trends and developments might impact their own organization. (Note that sometimes STEEP is expanded to include cultural or legal forces.)

The STEEP technique encourages users, be they individuals or organizations, to look more deeply, and think about their operating environment with a longer term perspective. ∎

◗ **Step 3: Identify Driving Forces in the Environment**

What driving forces and factors in the overall environment (contextual plus working environment) will influence the internal forces identified in previous step? There are two possible approaches to this question:

• First, identify and summarize major current and emerging drivers of change in Society, Technology, Economy, Environment, and Politics — a "STEEP" analysis (see insert opposite).

• Second, ask what are the dynamics behind the internal forces identified in Step 2. Based on the group's best knowledge, or a review of a STEEP analysis mentioned above, what trends occurring today are affecting or producing the key local forces identified?

◗ **Step 4: Rank Driving Forces by Importance and Uncertainty**

Step 4 involves ranking the driving forces. Some forces, *e.g.*, demographics, are relatively determined, or predictable. Others, *e.g.*, public opinion, are highly uncertain. Going through the forces one by one, workshop participants discuss how important each one is to the focal issue already identified in Step 1. They then add their degree of uncertainty. (There are several possibilities for ranking including the use of an intuitive 1-10 or a low/medium/high scale.) The goal is to identify both the most important and the most uncertain driving force (driver). Note that drivers with both these characteristics are referred to as "critical uncertainties".

Next, the group identifies at least two drivers. When more than two are identified, the 2x2 method requires either combining (clustering) two or more drivers into a more broadly defined driving force or considering different pairs of drivers as potential axes for the 2x2 matrix.

For example, in Figure 2 below, participants might select "Relevance of energy diversity" and "Attention to oil & transportation" as its axes, since these two have been voted the most important and most uncertain drivers. However, before confirming this decision, it is important to consider the relative merits of different pairs of drivers from the shaded area of the graph on the 2x2 scenario axes. This is explained below in Step 5.

◗ **Step 5: Selecting the Scenario Logic**

Scenario logic may be defined as the context derived from the axes with participant input. The group usually starts with the critical uncertainties that score the highest. Participants then consider the interest and relevance to the focal issue or question of the four spaces created by different pairs of axes taken from the critical uncertainty zone (orange-shaded in Figure 2). This

FIGURE 2. RANKING DRIVERS OF CHANGE BY IMPORTANCE AND UNCERTAINTY

Source: author.
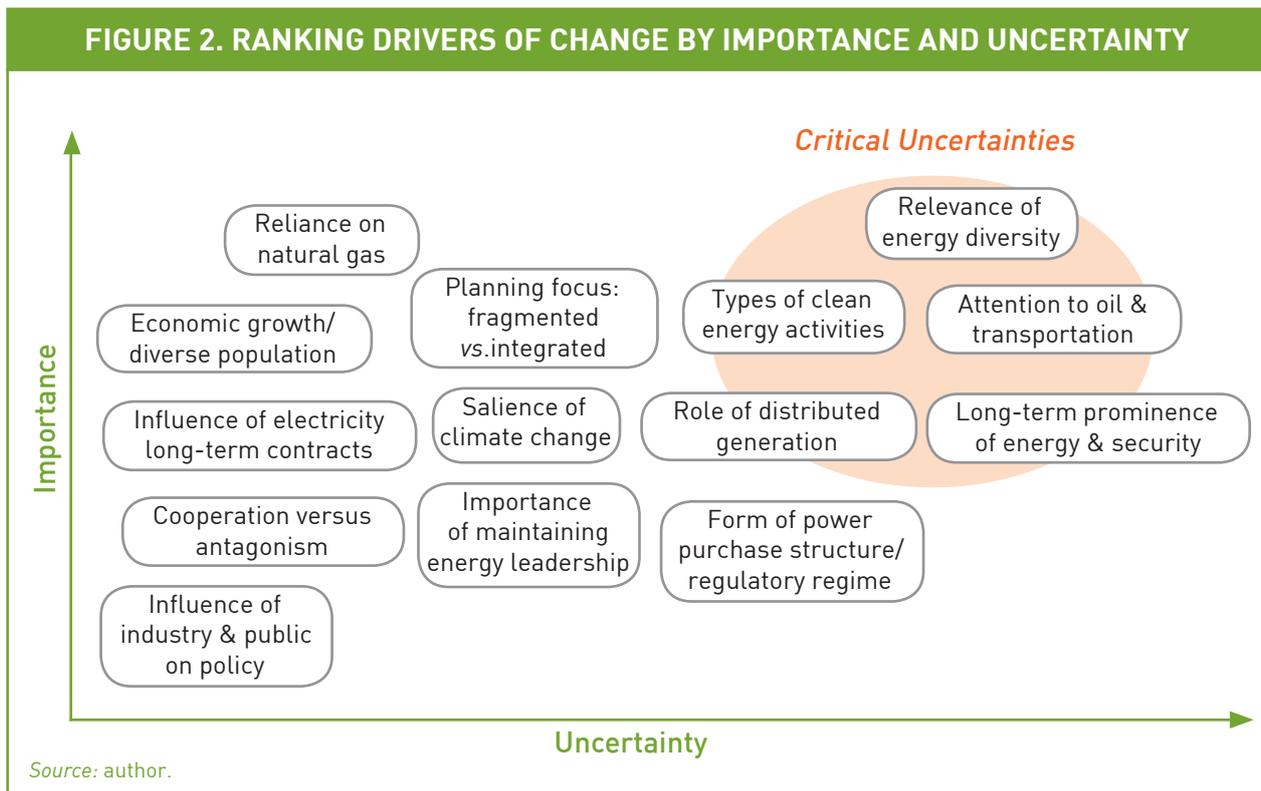
step ensures that the scenario quadrants created by the intersection of the two axes represent interesting and contrasting "spaces" in which to examine the focal issue.

There are, however, two main reasons why the two highest-ranking drivers of change may not be selected for the axes:

• First, if the drivers of change which have scored the highest on importance/uncertainty are related to each other or are interdependent. For example, "rate of economic growth" and "level of employment" are likely to move in the same direction. Consequently, two of the spaces created by the intersection of these axes (high growth-low employment and low growth-high employment) could be less interesting to develop.

• Second, when the two highest-scoring drivers of change are from the same STEEP category, *e.g.*, "rate of climate change" and "resource depletion" are both environmental. It is generally more enriching and rewarding to choose factors from different categories. In fact, one social or political driver of change is usually included.

The choice of axes may be made by the lead facilitator, but it is useful to hold a plenary discussion on the axes at the workshop. With input from the group, the facilitator will also decide on the polarities of the two axes. For example, if economic growth has been selected as an axis, the scale could range from high to low, sustainable to unsustainable, or inclusive to exclusive (unequal).

Sometimes one of the scenario spaces turns out to be less interesting than the other three. This often occurs when that scenario space is too close to the present. Should this be the case, other axis combinations may be attempted. However, sometimes, particularly with a smaller group, the facilitator may decide to push ahead with just three scenarios.

The facilitator should take this opportunity to explain that choosing two critical uncertainties for the axes does not necessarily mean that the other drivers are relegated to a lower status. Instead, it simply means that the two driving forces chosen for the axes structure the scenario

FIGURE 3. BUILDING THE SCENARIO MATRIX USING CRITICAL UNCERTAINTIES

Critical Uncertainty 1

Scenario 1   Scenario 2

Critical Uncertainty 2

Scenario 3   Scenario 4

Source: author.
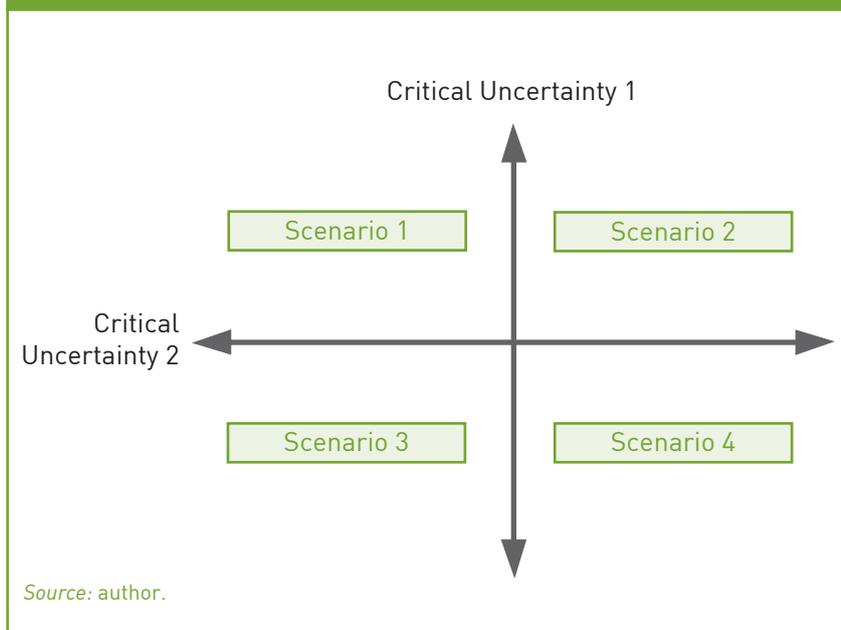
spaces so that they represent a broad range of relevant future scenarios.

Before proceeding to Step 6, the group may be asked to identify some of the salient characteristics of each scenario space by coming up with three to five bullet points on each one.

◗ **Step 6: Fleshing Out the Scenarios**

In this step, each workshop table is allocated one of the four scenario spaces and asked to create a narrative consistent with the logic of the space, especially with regard to the axes. At first, participants may feel overwhelmed by the challenge of building a future world with relatively few elements, but the specific actions outlined below should guide them.

Participants start with the bullet points mentioned at the end of Step 5. They may modify these, if necessary. Using some of the main drivers of change identified during the STEEP exercise, each table considers what their possible outcomes would be within its own scenario space.

In addition to providing a basis for the scenario narrative, this systematic review of the drivers ensures that the scenarios are well constructed and therefore easier to contrast and compare.

The tables then explore connections and interactions between the drivers, introduce events and develop a story that leads to the scenario endpoint. The only constraints imposed at this stage are consistency (within the scenario), relevance to the focal issue or question, and reference (direct or indirect) to the drivers of change.

Scenarios should aim to be both memorable and plausible. Some participants are inspired by film scripts and a catchy title. Groups should be encouraged to make their work distinctive, even if the result may strain credulity. Remember that a scenario can always be "softened" after the workshop.

◗ **Step 7: Implications**

Various tools and techniques serve to explore the implications of the scenarios, both generally and more specifically regarding organizational objectives and decisions (see Alternative Techniques herein for ideas). Groups should ask the following fundamental questions: (i) how does the decision, plan or strategy look in each scenario? (ii) what changes could render the strategy more robust?

Scenarios also help participants envision how competitors, customers, or other countries may behave in each scenario. Collectively filling in a simple table like the one below may yield more ideas.

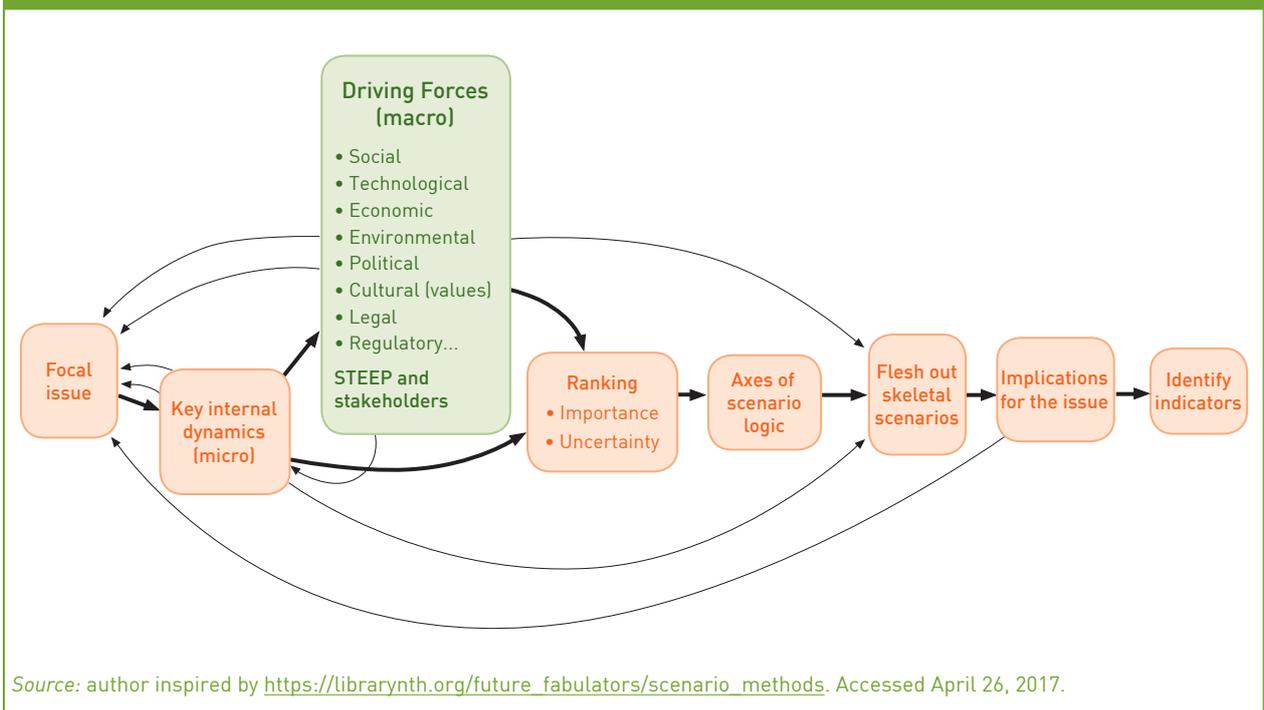| TABLE 1. TABLE TO HELP THINK THROUGH SCENARIO IMPLICATIONS (ENERGY EXAMPLE)			
Opportunities	**Allies**	**Threats**	**Competitors**
Fracking	Labor unions	Environmentalists	Biofuels
...			

Source: author.

◗ Step 8: Selection of Leading Indicators and Signposts

By developing scenarios, participants create a set of different paths along which the present situation may evolve, as well as a final destination. It may be useful to decide on an indication which would show that if one of these paths is taken then things are likely on track to reach that destination. For example, if one scenario presents an authoritarian regime which is expected to become more liberal and democratic, an indicator on that particular path could be that a certain politician or political party is promoted to a more prominent position.

Hence, in addition to describing the endpoint of the scenario, users or facilitators often explain how that endpoint may be reached, and capture this in a set of indicators that can then be monitored in the environment.

In addition to specific data points, which can be difficult to determine, the groups can also consider changes (i) in the direction of trends, and (ii) how these changes may be observed. A key question: which variables might serve as good indicators of the direction of change?

FIGURE 4. THE STEPS OF THE 2X2 MATRIX TECHNIQUE

Source: author inspired by https://librarynth.org/future_fabulators/scenario_methods. Accessed April 26, 2017.

Tips and Best Practices

◗ General

• Use a seasoned facilitator to run the scenario workshop until you have gained enough experience to run it yourself.

• Formulate the purpose of the scenario work as a question. If this is not possible, perhaps the purpose itself is unclear.

• Consider early on how exactly the scenarios will be used. Their use will have implications in the design of the process, *e.g.*, who participates, which methodology is applied, and how the scenarios are communicated.

◗ Participation

• Where possible use a workshop setting to develop scenarios, ideally with a small team (10 to 25 participants), representing a wide range of expertise and drawn from different backgrounds.

• Invite participants who represent a mixture of subject-matter experts (academics, NGO workers and business professionals), as well as stakeholders.

• Keep in mind that expert involvement heightens the authority and credibility of the scenarios.

◗ Communication

Scenarios need to be compelling and convincing. In fact, participants should be able to visualize plausible futures. Communication can be enhanced through the following four basic techniques:

• Give names to each scenario, a distinctive, memorable title that encapsulates key characteristics. This helps when discussing the scenario and its implications.

• Use diagrams to illustrate the links between key trends and scenarios.

• Adopt media headlines and stories to make scenarios more engaging, enabling people to imagine what it would be like to live in this future.

• Create short videos for some scenarios as the audiovisual medium is both powerful and persuasive.

Errors to Avoid

◗ **This is not mathematics.** Although the method uses axes, these scenario axes and quadrants are a basic separation device which ensures that the scenarios created possess some fundamentally different characteristics. As mentioned above, the scenarios are contrasted, or contrasting, and cover a full array of possible outcomes.

◗ **Avoid assigning probabilities.** None of the scenarios created will happen. The purpose of constructing scenarios is to make people aware of how many uncontrollable factors will shape the future. A scenario's value lies in the fact that it enables participants to think through what kind of things could happen. The idea is that everyone involved can thus be better prepared or less surprised. Scenarios essentially provide a method for generating an array of useful hypotheses.

◗ **Make sure the scenario work is not only rigorous and systematic but can also be presented as robust.** Keep records of data sources plus any ideas which could be annexed to a final report. This thoroughness will reassure clients or senior staff who are nervous about the use of intuitive and qualitative methods.

❿ **Ensure that the drivers of change (notably those selected for the axes) are transformative forces and not outcomes.** Express the axis descriptor in neutral language and check to see whether it can take different directions (or polarities). For example, use "migration" or "movement of people", rather than "**em**igration" or "**im**migration".

❿ **Resist the temptation to ask consultants to develop scenarios for the group.** The benefits of workshops with diverse participants (experts, employees, and external stakeholders) outweigh the disadvantages (time and cost).

❿ **Do not confuse the time horizon of the scenarios (*e.g.*, 2030) with the time horizon for action revealed by the scenario process.** Scenarios describing the international environment in 2030 will have immediate implications for decision-makers; *i.e.*, action may be required now.

Frequently Asked Questions (FAQs)

❿ **How should I take into account megatrends and predetermined elements in scenarios?**

Drivers of change such as demographic trends, use of information technology and climate change will influence a wide range of scenarios. These high impact "megatrends" will not, however, usually be regarded as "critical uncertainties" as their influence is seen to be relatively predictable. Given their pervasiveness, these major trends are likely to be taken into account naturally in the development of most scenario narratives. As a reminder to do this, Step 6 of our guide to applying the method recommends a "systematic review of the drivers" during scenario construction.

❿ **Some scenarios are clearly more probable than others. Is it worthwhile spending the same amount of time on each one?**

Two critical uncertainties for the axes are chosen and then used to form the scenario quadrants deliberately in order to engineer four spaces which then need to be explored. It should be hoped that at least one of these is somewhat unexpected or counterintuitive. Rarely is it worth ruling out one of these spaces because it seems improbable. As Stanford University professor Scott Sagan[1] once said, "Things that never happened before happen all the time."

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1. Scott Douglas Sagan is the Caroline S.G. Munro Professor of Political Science at Stanford University and Senior Fellow at Stanford's Center for International Security and Cooperation (CISAC). Known for his research on nuclear weapons policy, he has served as a consultant to the office of the Secretary of Defense and at the Sandia National Laboratories and the Los Alamos National Laboratory.

Case Study — Edible Insects and the Future of Food: A Foresight Scenario Exercise on Entomophagy and Global Food Security[2]

The following case is extracted from a report by Dominic Glover and Alexandra Sexton [writing generally on behalf of the group as "we"] with minor abridgement. It provides an account of the process and results of a 2x2 scenario exercise that they led under the supervision of Alun Rhydderch for the Institute of Development Studies (IDS) at the University of Sussex, England.

To consider the potential contributions of edible insects in the future global food system by 2030, three activities were undertaken: a literature review; an online guided discussion with stakeholders, incorporating a questionnaire; and a foresight scenario exercise.

Literature Review, Questionnaire and Online Discussion

The literature review commenced with a broad, open-ended search for relevant sources of information including academic papers, gray literature [unrefereed e-publications] websites, blogs and other online sources. We reviewed documents and web-based materials from the life and social sciences, the media, non-governmental organizations (NGOs), international organizations, government agencies, commercial businesses and individual advocates. Through this exercise, we built up a current picture of the topic and the field, gained an understanding of key issues and debates, and identified prominent individuals, organizations, interest groups and other stakeholders in the sector. We used this information to inform our activities in subsequent phases of the project, including writing this report.

In December 2014, we convened a two-day online discussion. The event was advertised using social media and individuals were invited to register in advance. Registered participants were invited to complete a questionnaire before the event. These interactions further crystallized some key discussion points and highlighted areas of knowledge, ignorance, and uncertainty. The insights gained from the questionnaire and discussion informed the design and selection of participants for the subsequent scenario workshop.

The Foresight Scenario Exercise

Selected experts and stakeholders were invited to participate in a face-to-face foresight scenario exercise over two days in March 2015. This was a mixed group of participants including academic researchers, project managers, entrepreneurs, and commentators on entomophagy issues. To supplement the expertise of participants who were already familiar with the topic of entomophagy, we brought in some people with complementary expertise in areas such as food security and nutrition, food safety regulation and science policy. Participants contributed in their personal capacities.

The scenario exercise comprised two steps: a drivers-of-change analysis (STEEP exercise) followed by scenario building using the "two axes" method. The STEEP exercise is designed to identify the broad, potent forces and trends that seem likely to shape the future, even if their development and eventual impacts may be profoundly uncertain. Scenarios might be under-

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2. Taken from IDS 2015. The full report including list of drivers of change and full scenarios can be accessed at http://www.ids.ac.uk/publication/edible-insects-and-the-future-of-food-a-foresight-scenario-exercise-on-entomophagy-and-global-food-security.

stood as a set of thought experiments focused on identifying plausible pathways from now into the future, as well as the types and scales of sudden shocks that might take us by surprise.
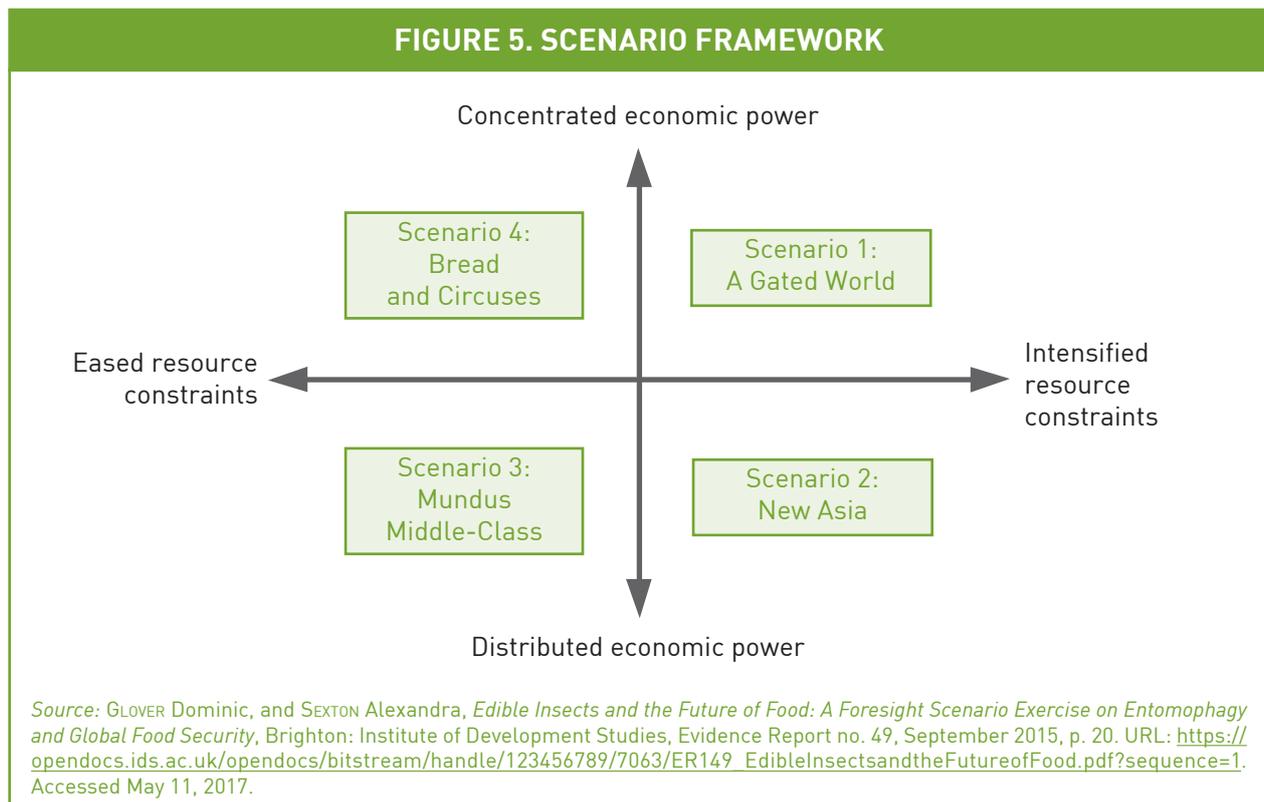
Identifying Drivers of Change (STEEP)

The first step in the process was to think about broad drivers of change which participants expected would shape society and the economy in the coming decades. These could be expected to shape the societal, economic, and technical contexts into which, or alongside which, an edible insect sector might or might not emerge. The drivers were generated by participants in a brainstorming fashion, then clustered by the participants and facilitators into loose groups under five broad categories: Social, Technical, Environmental, Economic, and Political (STEEP). After the workshop, the drivers generated during the STEEP exercise were further organized, consolidated, and summarized by the authors to present them clearly and concisely in this report.

Scenario Framework

Guided by the full set of STEEP drivers generated by the participants, the workshop facilitators pinpointed two important themes that could serve as axes to structure the scenario exercise. The chosen axes were "resource scarcity" (intensified versus eased) and "economic power" (concentrated versus distributed). These two axes created four quadrants to be populated with future scenarios. The workshop participants were divided into four groups to construct the four scenarios (see Figure 5):

1. A Gated World
2. New Asia
3. Mundus Middle-Class
4. Bread and Circuses.

FIGURE 5. SCENARIO FRAMEWORK

Source: GLOVER Dominic, and SEXTON Alexandra, *Edible Insects and the Future of Food: A Foresight Scenario Exercise on Entomophagy and Global Food Security*, Brighton: Institute of Development Studies, Evidence Report no. 49, September 2015, p. 20. URL: https://opendocs.ids.ac.uk/opendocs/bitstream/handle/123456789/7063/ER149_EdibleInsectsandtheFutureofFood.pdf?sequence=1. Accessed May 11, 2017.

Participants in the scenario exercise were asked to look ahead approximately 15 years to 2030. In practice, the deliberations ranged quite fluidly from the next decade to as far as 2050 and sometimes beyond. In other words, the suggested timescale for these scenarios should probably be understood as loosely between 15 and 35 years.

Each scenario appears prefaced with some key characteristics (see below) and presents broad contextual developments before zooming in successively, by stages, on the implications for food production and consumption in general and edible insects in particular. Each scenario is accompanied by one or more vignettes illustrating "a day in the life" of someone living in the hypothetical world envisaged. Each scenario concludes with reflections on the broad implications for global food security and food system sustainability.

(For scenarios, "day in the life" and implications, see full report online at http://www.ids.ac.uk/publication/edible-insects-and-the-future-of-food-a-foresight-scenario-exercise-on-entomophagy-and-global-food-security. Accessed May 18, 2017.)

◗ Scenario 1: A Gated World

Characterized by **concentrated economic power X intensified resource constraints**

Key features: Vertically integrated, socio-economically stratified food systems. Large-scale production of insects — usually in highly processed forms — by small number of global corporations for mass consumption.

◗ Scenario 2: New Asia

Characterized by **distributed economic power X intensified resource constraints**

Key features: High-consumption global economy with cosmopolitan tastes and regional production systems, in which conventional meat becomes uncompetitive.

◗ Scenario 3: Mundus Middle-Class

Characterized by **distributed economic power X eased resource constraints**

Key features: Major technological advances (particularly in energy and consumption) and transformation in consumption behaviours towards less exclusive and wasteful ownership models.

◗ Scenario 4: Bread and Circuses

Characterized by **concentrated economic power X eased resource constraints**

Key features: Geopolitical power concentrated in two interdependent economic blocs (the "West" and an Asian sphere in the East dominated by China). Population concentration in megacities, with food production organized around these regional hubs.

Alternative Techniques

The 2x2 matrix technique remains the most widely used scenario generation technique, especially for short or medium-length exercises. Alternative techniques may also be used without the need for significant additional resources or much software. Although not exhaustive, the list of alternative techniques below provides some ideas.

◗ The so-called inductive technique, which resembles the 2x2 technique described here, except that groups are not given the starting parameters of a quadrant defined by the two axes and are therefore required to work directly with the drivers of change to create scenarios (Scearce, Fulton and GBN community, 2004).

◗ The Manoa model, which uses four scenario archetypes as a starting point for the quadrants. The rationale for this approach is that stories about the future tend to fall into one of these four archetypal categories (Dator, 2009).

◗ The aspirational futures approach, which develops scenarios in three zones of aspiration, expectation and desperation (Grandjean, 2017).

◗ The branch analysis method, which generates alternative futures based on pre-defined turning points, *e.g.*, political elections (Foresight Horizon Scanning Centre, 2009).

◗ The CLA (Causal Layered Analysis) approach, which provides a way of understanding the dynamics of an issue at different levels, ranging from the clearly visible and dominant to the underlying and hidden (Inayatullah, 2017).

◗ The morphological analysis approach, often deployed for large scale work, which identifies several possible outcomes for a number of drivers of change. Combinations of these different driver outcomes are weighed up, and a small number of these combinations chosen for development into scenarios (Godet, Durance, 2011).

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