

There have been many publications dealing with ForSTI, especially since the turn of the twenty first century. Much of this literature (including many web resources) presents the results of particular projects; and unfortunately it is quite often rather unclear about just what data and which methods have led to what conclusions. Despite the apparent prevalence of airport bookshop paperbacks—ones where some expert conjures their vision of the future out of a magic hat—there is a great deal more material available that attempts to be systematic and transparent as to methods than was the case a few years ago.

This book has sought to make a distinctive contribution by simultaneously:

- outlining the philosophy and the origins of this approach, as well as the rationale for adopting ForSTI in specific circumstances; and
- explicating many of the most common techniques in use and the methodological decisions to be made.

The preceding chapters have shown that ForSTI is a versatile approach, and is one that will often be need to brought to bear when we are considering STI developments. ForSTI is also highly relevant to the grand challenges confronted by our civilisation, where our responses will often require the application of new STI. This is not to say that ForSTI is a panacea. Many other approaches need to be employed if we are to tackle grand challenges and seize great opportunities. But without ForSTI, we suggest, there are substantial risks of failing to adequately address major long-term issues.

This depends upon ForSTI itself being “fully-fledged”—using multiple methods, and drawing upon the contributions and engagement of wide community of stakeholders as well as a narrow group of experts (or worse, narrow interest groups). Such ForSTI may not always be feasible—there may be social or political obstacles, or some unanticipated emergencies may be so acute that we have to act without much time for reflection. But while ForSTI is not always appropriate or even feasible, and while it will never be the only approach needed to face long-term

issues, this does not undermine the case for ForSTI being undertaken more systematically and more widely than it has been to date. Likewise, the accumulation of experience on ForSTI practice does not mean that one model of ForSTI needs to be imposed on practitioners. In reality, there is much room for further experimentation and development of new approaches. It will also be important to document and share lessons learned from the exercises that are undertaken in the evolving contexts of our ever-changing world.

This book has examined major phases of ForSTI activities—beginning with the need to be clear about our objectives, as well as open-minded as to what our conclusions might be. While particular activities and tools will tend to predominate at specific phases of the exercise, we have stressed that there is a great deal of flexibility in how this can be organised. We may often want to refresh our horizon-scanning, or provoke a fresh round of creativity, at various points in the process, for example. While it is a good idea to plan for this from the start, it is also a good idea to leave “wriggle room”—to allow for experiment and innovation in the course of the exercise. Often some modifications of familiar procedures are forced upon us—for example, because we are running out of time in a workshop! But often changes are inspired by the activity itself—we may need to bring new criteria to bear in making recommendations or selecting among options, for example, perhaps because key stakeholders have demonstrated their importance or because the exercise has thrown up considerations that has not been anticipated at the design stage.

Previous chapters have stressed that there is no single recipe for a successful ForSTI exercise—such an exercise needs to be tuned to objectives and resources. Now we must reiterate the point that it is unwise to be tied down in too rigid a structure. This is especially true when we have not undertaken sufficient pilot testing of the tools. Pilot testing is important—trying out a questionnaire on a few friendly and critical respondents, “talking through” how a workshop is to operate with facilitators and others who have had experience of such activities. But even after such testing, we may well find it valuable to modify our plans in response to the early feedback on implementation. In a study that one of the authors conducted, it was only during implementation of a multilingual Delphi that it was found that respondents in one language found the translation of questions to be very poor (new translations needed to be commissioned) and that another language, since it used non-Latin characters, could not be processed by the software (new software was required)!

ForSTI can be used for many purposes, as has been made clear at numerous points in this book. Most exercises will indeed address several goals, even though it is typical for one or two to dominate. Just as the implementation process may need to evolve, the intended objectives of the exercise may evolve. Sometimes this will be forced upon the activity by outside influences—there may be a major political change that requires a new approach to policy and thus to the factors to take into account in the exercise; or there may be disruptions concerning our focal object, such that a technological breakthrough or disaster overturns some of the assumptions on which the exercise was based. The objectives may need to be

shifted to accommodate a new external agenda (though if the ForSTI team consider that what is going on is more a matter of fashion or ideology than of substance, they may resist this). Internal developments can also play a role. The exercise may give rise to new perceptions. While these will most often be framed in terms of the original objectives of the activity, on occasion they may warrant some rethinking of these objectives. For example, it might be that serious risks are identified in relation to a line of activity originally earmarked as promising for commercial development or for application to meeting a social need (whether or not policies are actively promoting it). Devising strategies for mitigating these risks could then be positioned as one of the objectives of the study. (Such risks are not necessarily technological hazards or security threats—they might concern, for instance, social inequalities or economic challenges—for example, massive life extension may imply all sorts of ongoing medical costs, as well as possible social disruptions.) Conversely, opportunities could also be identified which were not part of the original brief. Such opportunities might not even involve the focal object, but may be spotted in analysis of the wider system in which this object is located—for example, applications of a new technology may be seen in areas other than those which the exercise is focused on.

ForSTI can be used for many purposes, then, and many methods are available to bring to bear on the focal topic. The choice of methods, as discussed earlier, will in large part reflect resources (not least time!) and capabilities (social and political as well as technical), as well as the nature of the topics of concern and the objectives of the work. But in general, a fully-fledged exercise will make use of multiple methods. In particular, benefits may be drawn from the combination of both systematic formal tools (such as statistical analysis or modelling) with creative thinking (such as brainstorming in the context of wild cards scenarios and vignettes), and of both expertise (in panels, Delphis, etc.) and broader participation (stakeholder engagement and consultation in workshops, conferences, surveys, etc.). The combination of approaches should both enhance chances of spotting unexpected but plausible developments, and the mobilisation of state-of-the-art scientific understanding of the focal object. It can help to affect both political and scientific legitimacy and thus achieve a measure of ownership and buy-in from key stakeholders. (Some stakeholders may remain opposed to the ForSTI process or its results, usually because they feel their immediate interests to be threatened. The answer to this is to mobilise other stakeholders in support of the exercise (or some contentious component of it), on cognitive more than on emotional grounds.)

Another aspect of ForSTI where we would argue that there is no universal solution concerns just how different methods are combined together. There is some tendency for particular methods to be more or less appropriate at different phases of the ForSTI process, as noted in Chap. 3 and demonstrated in subsequent chapters, but, as also noted, this is in practice quite flexible. In accumulating further experience and evidence concerning ForSTI studies, it would be valuable to examine how, and under what rationale, different tools have been brought together, and with what result. For instance, Pombo-Juarez et al. (2016, forthcoming) suggest a particular combination of methods—and implementation of these methods in

particular ways—to help ForSTI interventions into complex areas of STI development, where the applications of the new technologies are liable to cut across multiple layers of governance and multiple disciplinary and professional fields. Discussion of the combination of (specific implementations of) methods has been relatively underdeveloped in the ForSTI literature, despite the proliferation of methodological guides in the last decade. This is an important theme for practitioners to focus upon, and a promising line for research on ForSTI practice.

There have been several discussions of the future of ForSTI itself (though we are not aware of much articulation of this issue of methods mix in these discussions—often indeed they simply represent advocacy of one or other set of tools). More prominent has been stress on the potential of ICT applications to ForSTI and foresight more generally. Ideas include crowdsourcing of ideas for wild cards, large-scale online surveys and consultations, online access to models and modelling tools, use of virtual reality and visualisation approaches to explore scenarios and trends, virtual meeting rooms together with face-to-face meetings enhanced by telepresence of remote participants, and much more. By now, many of these ideas have been tried out; often the degree of success is less than originally anticipated, but it is common for those involved to see great potential in future development of the tools. As ICT becomes more embedded into everyday life, it can be expected that there will be much more experimentation with these approaches, and opportunities to involve all sorts of stakeholders in their development. The major challenge, it can be suggested, will be that of retaining the fruitful and insightful elements of human dialogue, even when there is less emphasis on face to face contact and synchronous discourse.

Furthermore, it is important not to neglect the continuing opportunities to use approaches that are less reliant on ICT. One example which has proved successful in a number of exercises, for example, is graphic facilitation, where a cartoonist provides ongoing illustrations of the group process and/or of the future appraisals it creates. These cartoons can both provoke dialogue in the workshop, and helpful illustration of the ForSTI themes in eventual publications. Examples of visual thinking and graphical facilitation applied in urban systems by Ravetz can be seen at the Urban 3.0: Creative Synergy & Social Intelligence website.¹ It may well be that other sorts of social facilitation technique—for example, commentary from anthropologists or cognitive psychologists—could play useful roles in facilitating social interaction in the course of ForSTI. In this context, we would suggest that ways of establishing and improving dialogue between expert and lay participants need particular attention.

As well as application of new approaches like this, the boundaries between ForSTI and other fields of long-term analysis need to be confronted. The focal objects of ForSTI are frequently similar to those addressed in by such other fields as emergency preparedness (Dehmer et al. 2015), risk analysis (Palomino et al. 2013), environmental modelling (The Royal Society 2015), climate change analysis (IEA

¹Available at: <http://urban3.net/visual-thinking/>, accessed on: 20.01.2016.

2015), and the like. The social dimensions of STI are often poorly addressed—by social scientists no less than by scientists and engineers: ForSTI may be an arena whereby disciplinary barriers can be broken down to help resolve this problem. More work is required on this, and the ways in which social dimensions of STI have been confronted in ForSTI to date can be more explicitly documented and analysed.

There is no likelihood that the world will become a simpler, less turbulent context for STI, nor that STI itself will cease to evolve rapidly. ForSTI will, then, remain important for the anticipatory governance of STI-related topics—of which there are a vast number. Recent experience suggests that even countries with well-established ForSTI institutions may see a scaling back of activities—this has been the case in the UK since the economic crisis of the last few years, where the ideology of a new government and its commitment to reducing many public sector activities (under the guise of tackling austerity) resulted in a much weakened Foresight Programme. The term “foresight” may also fall out of fashion, as rising politicians and bureaucrats seek new slogans to provide a narrative underpinning for their careers. The need for ForSTI is likely to remain, but the activity may take place under new labels and guises. It is important to ensure that the core principles survive, and that, whatever the label, we can continue to learn from the decades of experience with ForSTI that have been accumulated. This is not guaranteed, because new labels may provide opportunities for the activity to be “highjacked” by interested parties—academics whose reputation depends upon their appearing to be doing something new, consultants who seek to capture a lucrative market, and policymakers who wish to be identified with something that looks like a quick fix to addressing intractable problems, for example.

ForSTI is too important to be left to narrow elites. Everyone is affected by the outcomes of STI. Few people can claim to have a reasonable grasp of more than a few of the disciplines and practices involved in contemporary STI, of course. But ForSTI can help to alert many more people to the critical issues that these raise, and enhance the level of debate they occasion, and assist in building capabilities to act constructively given this. Development of capabilities for fully-fledged ForSTI is thus an urgent social necessity. Hopefully this book, by setting out experience, philosophy, and methods in some detail, has supported this process.