Editorial

Jan Rotmans

Dutch Research Institute for Transitions,
Erasmus University Rotterdam, The Netherlands
E-mail: J.Rotmans@fsw.eur.nl

Jill Jäger

Sustainable Europe Research Institute, Vienna, Austria
E-mail: fuj.jaeger@nextra.at

Paul M. Weaver

Wolfson Research Institute,
University of Durham, UK
E-mail: pweaver@noos.fr

Biographical notes: Jan Rotmans is the Scientific Director of the Dutch Research Institute for Transitions (DRIFT) and is a Full Professor in Transitions and Transition Management at the Erasmus University, Rotterdam, The Netherlands. He is the Scientific Director of the Dutch Network on System Innovations: Transitions to a Sustainable Society (KSI). He is one of the founders of Integrated Assessment and created the IMAGE and TARGETS Integrated Assessment Models. He is the coordinator of the MATISSE project.

Jill Jäger is a senior researcher at the Sustainable Europe Research Institute (SERI), Vienna, Austria. She has played a leading role in projects studying the design of assessment processes and the links between science and policy in the area of global environmental change. Her interest is in sustainability science and she is a founding member of the European Sustainability Science Group. Within the MATISSE project, she leads stakeholder engagement activities and external communication.

Paul M. Weaver is a senior researcher at the Wolfson Research Institute, Durham, UK, and is a Research Manager at Groundswell Research Associates. His interests include innovation for sustainable development and the dynamics of transitions. His books include Sustainable Technology Development (Greenleaf Publishing) and Eco-Restructuring (UNU Press). Within the MATISSE project, he leads the development of a conceptual, theoretical and methodological framework for integrated sustainability assessment.

1 Introduction

The topic of this special issue is Integrated Sustainability Assessment (ISA) and its potential role in achieving sustainability-oriented governance and more sustainable

development. This is a topic that has featured before in the *International Journal of Innovation and Sustainable Development*. Two of the Guest Editors for this special issue, Paul M. Weaver and Jan Rotmans, wrote a paper introducing ISA and its development in the context of the EC-funded Methods and Tools for Integrated Sustainability Assessment (MATISSE) project, which was published in the journal in 2006. The Weaver–Rotmans paper was written at the outset of the MATISSE project when ISA was at an early stage of conceptual development and its potential was still to be developed and tested. The tool and model development activities of the MATISSE project and its illustrative case studies were then only just at their start. It is now timely and appropriate, therefore, as the MATISSE project nears its completion, that we follow up on that earlier paper, reporting what progress has been made and making available the latest project developments and emerging findings about ISA. This special issue provides a far broader and much deeper treatment of issues that the earlier paper could only touch on briefly.

2 ISA and MATISSE

The Methods and Tools for Integrated Sustainability Assessment (MATISSE) project, funded by the European Commission under the 6th Framework Programme,[1] aims to contribute to sustainability-oriented governance by providing innovative concepts, methods, tools and process-architecture for conducting ISA. The project with 22 partners from institutes in 11 European countries started in April 2005 and will end in April 2008. The project addresses the use of sustainability assessment in the European context, but the innovative concepts, methods, tools and insights it is developing are relevant generally to questions concerning the role that sustainability assessment might play in supporting sustainability-oriented governance and in furthering sustainability transitions. The approach taken to learning within the project may also hold wider implications for other projects in the emerging field of science in support of sustainable development.

Fundamentally, MATISSE is a project with a mandate to be innovative methodologically; it seeks to begin working on a new generation of approaches and tools for ISA that will be capable of exploring transition pathways. This is a long haul and ambitious endeavour that will continue beyond the duration of the MATISSE project, but MATISSE marks an important beginning and is challenged with setting out the overall 'concept' and developing some of the key elements that will be needed to guide future work.

An early step in the project was to make a 'gap' analysis by reviewing the theory and current practice of sustainability assessment and especially its institutionalised use in making formal *ex ante* policy assessments. Currently, most practical applications of sustainability assessment in policy-making fulfil a pragmatic role in screening already-tabled sectoral policy proposals that have no sustainability orientation per se. The gap analysis undertaken in the MATISSE project reveals that as policy assessment is implemented currently in the studied jurisdictions, it is unable to fulfil the purposes claimed for it, especially that of assuring that policies contribute toward sustainable development.

The underlying reasons for this 'delivery gap' are systemic and institutionalised in the policy-making process itself, but a fundamental obstacle is that the policy- and development-regimes in the jurisdictions studied have different and conflicting

overarching objectives, of which sustainability is only one among several that are not always afforded equal importance. Concerns for economic growth, jobs, competitiveness and minimal regulation dominate policy-making currently (the Lisbon agenda).

While there will always be a need to screen sectoral policies, there is also a need for strategic-level analyses, where the objectives include exploring alternative framing paradigms for policy development and helping to design long-term, cross-sectoral approaches that specifically target sustainable well-being. This need is not fully recognised yet and is unmet, but there is a potential role here for sustainability assessment if this can be translated successfully into criteria for the design and use of an appropriate assessment method. The MATISSE project aims to provide innovative methods, tools and process-architecture for conducting ISA that could help meet this need.

Against this background, ISA and the purposes it seeks to serve were defined in the MATISSE project. ISA is intended as a proactive, strategic and potentially transformative process to give an explicit sustainability orientation to policy-making and other undertakings concerning social–ecological systems. Such undertakings would be expressly intended to address persistent problems of unsustainable development and to take up opportunities for delivering well-being in ways that are more sustainable. The objectives of an ISA are to develop both a shared interpretation among stakeholders of the dimensions of sustainability for a particular social–ecological system and a suitable representation of the system (scoping), transform these into a shared vision on a sustainable future (envisioning), and explore various pathways for a transition towards sustainability through a range of innovative experiments (experimenting), as a basis for learning about key relationships and ways of reframing problems and solutions (learning/evaluating). The formal definition of ISA reflects these means and ends:

> "ISA is a cyclical, participatory process of scoping, envisioning, experimenting and learning/evaluation through which a shared interpretation of sustainability for a specific context is developed and applied in an integrated manner in order to explore solutions to persistent problems of unsustainable development." (Weaver and Rotmans, 2006)

3 Design of an ISA process

The essential design requirements for ISA stem directly from its intended role as a process for exploring and supporting issue reframing, policy reorientation (regime change) and approaches to transition. ISA represents a new mode of knowledge production that responds to the governance and management challenges of sustainable development. It offers a forum for defining 'socially- and ecologically-robust' targets and thresholds concerning conditions to attain or to avoid, integrating these as elements of operational, context-specific sustainability interpretations and exploring alternative pathways of transition.

Methodologically, ISA combines three elements: an integrated systems analysis, which seeks to secure broad scope for the assessment; a multi-level and agent-based analytical approach, which seeks to understand multi-level processes that could lead to structural change; and a cyclical, participatory process-architecture, which seeks to promote social learning among stakeholders through dialogue, experimentation, and capacity-building. To handle the complexity and concerns of sustainable development

ISA employs scale- and domain-exceeding concepts, such as stocks, flows and agents, and uses multiple time horizons that may extend over generations.

ISA, therefore, has a cognitive dimension, a process dimension and an analytical dimension. It brings together an *integrated systems analysis* and a *participatory process involving a selection of relevant stakeholders and actors.* The integration of stakeholders selected to represent different perspectives and interests is a basic requirement of ISA in order to develop a rich and robust interpretation of sustainability for a specific context, including what is at 'stake' and what it is that stakeholders seek to 'sustain'.

4 Relationship of ISA to current assessment practices

ISA contrasts with and complements the prevailing Sustainability Impact Assessment (SIA) approaches that are sometimes embedded within existing institutionalised ex ante policy impact assessment processes, such as the EU regime of Impact Assessment (IA).[2] (S) IA is a nested set of assessment processes each undertaken at a particular level in the policy hierarchy, whose coherence is assured by having a single overarching policy frame as common reference. The concern of (S) IA is to ensure consistency and coherence of initiatives with the established policy frame. By contrast, ISA is concerned with challenging prevailing policy and development-regimes and making possible the implementation of new policy frames. ISA requires modulation between scales and levels within a single sustainability assessment process. While (S) IA focuses on individual policies and single policy instruments, ISA focuses on policy programmes at a strategic level. The complementarities of the approaches mean that ISA can help (S) IA to become more effective in ensuring that policies are consistent and coherent with sustainability goals and (S) IA can help ISA by providing some methods, tools and expertise that are common to both forms of assessment.

An important practical lesson for ISA that emerges from institutional analysis of (S) IA practices concerns where and how ISA might be best used. ISA is a response to the need to build constituencies of support for actions that specifically target sustainable well-being. It, therefore, requires setting up or becoming involved in creative exercises that engage leaders of think-tanks, businesses and civic society with the object of visioning alternative futures and ways of reaching these. The idea of ISA is not that sustainability should be integrated into the IAs currently operating as part of formal institutionalised policy processes. Rather, it is to use ISA informally and in processes a short distance from formal policy-making, but such that influential parties are engaged in ISA so that they may ultimately exert their influence on the political system to make institutional changes that favour sustainable development. Thus, whereas the use of (S) IA is institutionalised, ISA is intended to be used informally, either at the very apex of policymaking in the processes of negotiating and designing high-level strategy or at a short distance from the formal policy making process in the setting of ad hoc high-level committees appointed for steering purposes. ISA could also operate outside the formal state-led policy process, providing a forum and an approach for addressing difficult development problems at a range of scales from local to international.

5 Papers in this special issue

The papers in this special issue are intended to illustrate both the approach taken by the MATISSE projects and its initial results.

The scene-setting paper by Paul M. Weaver and Andrew Jordan begins with insights into the challenges of sustainability assessment. These are used to structure an institutional analysis of actual practices in *ex ante* policy assessment, which exposes gaps and weaknesses concerning their potential to support sustainable development. New strategic roles for sustainability assessment are proposed to address these and a form of sustainability assessment (ISA) is suggested as 'fit' for this purpose. This leads on to making prescriptive recommendations about ISA design and use.

The following paper by John Turnpenny presents a case study on a strategic area of policy-making: the environmental Thematic Strategies of the European Union (EU). Using document analysis and an analytical framework for describing key features of assessments, the paper evaluates both the processes through which the Thematic Strategies have been developed and the use of *ex ante* policy assessment within these processes. It is argued that the barriers to using policy assessment to secure a stronger sustainability orientation for the Thematic Strategies hold lessons for the theory and practice of ISA.

J. David Tàbara and colleagues describe one of the case studies in the MATISSE project and report on the development of tools and methods to support ISA of water systems. They focus in particular on the visioning stage of an ISA process, reporting on visioning exercises, agent-based modelling and gaming to support systemic reflective learning and the building of alternative science-policy narratives and paradigms in the Ebro River Basin, Spain. They argue that new ISA tools and methods can help create the 'space' necessary for collaboration and agent transformation as well as provide a structured procedure for developing knowledge-rich narratives to empower niche developments that may be more sustainable.

Hermann Lotze-Campen reviews existing modelling tools that have been applied to a wide range of sustainability issues and have been used for policy-relevant sustainability assessments. The review covers biophysical models, socio-economic models as well as integrated social–ecological models. The paper discusses the role of models in the different stages of an ISA both to describe the system of interest and to explore changes in social–ecological systems. A case study is provided on how three prominent models are to be linked for ISA to reflect a widening of the boundary of the system of interest and to provide for the assessment to have fuller scope. The paper closes with a discussion of challenges and limitations in using models in an interdisciplinary setting and suggests that in the context of a complex issue such as sustainable development models are best regarded as heuristic tools and used accordingly.

One goal of the MATISSE project is to develop a set of modelling tools that attempt to reproduce and mimic a variety of 'transition pathways', including the special case of 'sustainability transition' pathways. Alex Haxeltine and colleagues describe the development of a guiding conceptual framework for the implementation of a series of transition models and as a 'bridge' between transition modelling efforts, on the one hand, and the various emerging strands of theory and empirical analysis on transitions, on the other hand.

This is followed by a paper by Loraine Whitmarsh and Björn Nykvist, who apply the transition modelling tool to the case of land-based mobility, using desk research and

stakeholder workshops to describe visions of sustainable mobility and identify possible elements of transition pathways.

Willemijn Tuinstra, Jill Jäger and Paul M. Weaver illustrate the role and functioning of learning and evaluation in assessment processes and in ISA particularly. The paper illustrates the different kinds of learning that can be found in an assessment process and gives two examples of assessment processes that have explicitly attempted to include evaluation and learning and where experiences have been documented. The reasons for including evaluation and learning in ISA are discussed in detail and this is followed by an analysis of a first round of evaluation and learning in the MATISSE project.

Finally, Tim O'Riordan, who has chaired the Advisory Board for the MATISSE project, provides some reflections on the challenges that ISAs face particularly in the political context, as well as some of the opportunities that now appear to be opening up.

6 First findings

On the basis of the papers in this Special Issue, it is possible to draw the following conclusions:

- Policy-making within the European Union and in many other jurisdictions is characterised by the coexistence of several different policy agendas, which are reconciled at the operational level for each individual policy proposal. This calls for the use of policy impact assessment process such as IA, SIA or RIA to highlight spill-over effects and policy conflicts. By contrast, ISA is an assessment process that seeks ways of reconciling different agendas and concerns at a higher strategic level. This has the potential to reduce conflicts and open new development opportunities at all levels of policy-making. ISA at a strategic level and more routine institutionalised processes of sustainability assessment at operational levels are therefore complementary assessment processes (see Weaver and Jordan).
- ISA is a process for structuring dialogue and analysis about how to make progress towards sustainable development. It is appropriate for dealing with persistent problems, but not for all policy areas. ISA supports policy development and change through development of common understanding of problems and widening the scope of analysis. It is a long-term endeavour given the needs for multi-disciplinarity, for stakeholder involvement at all stages and for consideration of all levels of scale (see Weaver and Jordan).
- ISA may not provide instant results in shifting policy onto a more sustainable track. But the broader, exploratory approach of ISA is most likely to find resonance in certain, well-chosen arenas, and add to the pool of longer-term knowledge, build significant relationships of trust among influential stakeholders, and potentially be a process that bears fruit over many years (see Weaver and Jordan).
- Achieving more sustainable development depends on establishing an interpretation or interpretations of sustainability in a given context using concepts such as stocks, flows and thresholds, including reflection on what to avoid as well as what to seek to attain. The relevant relationships, interdependencies and uncertainties can be anticipated, revealed and explored through an ISA process (see Tàbara et al., 2008).

- The ISA process explores development pathways and agency and exposes synergies and trade-offs among multiple objectives, actions, stakeholders, time horizons and places. The process also supports the identification and mapping out of fundamentally conflicting worldviews on sustainable development. ISA can, therefore, be used to ensure that decision-making promotes viable, effective and acceptable measures, avoiding unnecessary policy conflicts and reducing problem-shifting (see, for example, Tàbara et al., 2008).
- Integrated models exploring sustainability transitions and most economic models stem from different paradigms and address different needs. Most macro-economic models are rooted in equilibrium approaches and rational actor thinking, while integrated sustainability models function in between equilibria and focus on interactions among agents and autonomous behaviours that reflect diverse and evolving rationales. It is important to understand the situations for which these different kinds of models may be used and how they may be combined with other assessment methods (see, for example, Lotze-Campen, 2008).
- A transition is about radical, structural change achieved in incremental steps. The combination of radicalism and incrementalism is crucial: incremental changes alone could lead to sub-optimisation or lock-in. Transitions can be represented by shifts of dominance among different socio-technical systems referred to as 'niches' (those systems not currently dominant) and the 'regime' (the currently dominant system), so integrated sustainability models must be able to represent agents' learning behaviours and processes of cooperation and competition between agents as these affect the relationships between systems and their relative situations. Concepts and building blocks for new methods and tools have been developed to reproduce and simulate transitions and these provide insights into how transitions between equilibria might be supported and how inertias, such as path-dependent development and technology lock-in, might be overcome (see Haxeltine et al., 2008; Whitmarsh and Nykvist, 2008).
- 'Learning' is one explicit step in an ISA process, but the ISA approach also has the overall ambition to enhance social learning. However, merely following an ISA-like process does not necessarily lead to more sustainable policy: the way this process is used is far more important. There are clear implications for the forms and function of ISA in its role in long-term learning (see Tuinstra et al., 2008).
- Current institutional settings are not congenial for sustainability assessment. For ISA to be successful in changing institutional contexts, it is best used just outside the formal policy process. Importantly, there is movement in the business and industry sectors as well as in civil society for a more sustainable form of living and working. This should open opportunities for ISA in the future (see O'Riordan, 2008). In turn, this should improve the longer term prospects for institutionalised (S) IA procedures to become more effective.
- Using an ISA process makes policy interlinkages transparent and can support the identification of win–win strategies. The process can also stimulate actors from mainstream policy areas to consider potential niche developments. ISA enhances understanding of the complexity of (un)sustainability issues as well as the barriers to moving towards sustainability.

- From the perspective of sustainability assessment, it appears that the balance in investment in model development must be adjusted. In particular, substantial investment is needed in the development of the next generation of integrated sustainability models and in capacity building for modelling the dynamics of transitions. There is a need for agent-based, integrated approaches that provide simple representations of the system as a whole as well as the sub-system connections (see, O'Riordan, 2008).

References

Haxeltine, A., Whitmarsh, L., Bergman, N., Rotmans, J., Schilperoord, M. and Köhler, J. (2008) 'A Conceptual Framework for transition modelling', *Int. J. Innovation and Sustainable Development*, Vol. 3, Nos. 1–2, pp.93–114.

Lotze-Campen, H. (2008) 'The role of modelling tools in Integrated Sustainability Assessment (ISA)', *Int. J. Innovation and Sustainable Development*, Vol. 3, Nos. 1–2, pp.70–92.

O'Riordan, T. (2008) 'Some reflections on the conditions for favouring Integrated Sustainability Assessments', *Int. J. Innovation and Sustainable Development*, Vol. 3, Nos. 1–2, pp.153–162.

Tàbara, J.D., Roca, E., Madrid, C., Valkering, P., Wallman, P. and Weaver, P.M. (2008) 'Integrated sustainability assessment of water systems: lessons from the Ebro River Basin', *Int. J. Innovation and Sustainable Development*, Vol. 3, Nos. 1–2, pp.48–69.

Tuinstra, W., Jäger, J. and Weaver, P.M. (2008) 'Learning and evaluation in Integrated Sustainability Assessment', *Int. J. Innovation and Sustainable Development*, Vol. 3, Nos. 1–2, pp.128–152.

Turnpenny, J. (2008) '"Are we nearly there yet?" Lessons for integrated sustainability assessment from EU environmental policy-making', *Int. J. Innovation and Sustainable Development*, Vol. 3, Nos. 1–2, pp.33–47.

Weaver, P.M. and Rotmans, J. (2006) 'Integrated sustainability assessment: What, why and how', *International Journal of Innovation and Sustainable Development*, Vol. 1, No. 4, pp.284–303.

Weaver, P.M. and Jordan, A. (2008) 'What roles are there for sustainability assessment in the policy process?', *Int. J. Innovation and Sustainable Development*, Vol. 3, Nos. 1–2, pp.9–32.

Whitmarsh, L. and Nykvist, B. (2008) 'Integrated Sustainability Assessment of mobility transitions: simulating stakeholders' visions of and pathways to sustainable land-based mobility', *Int. J. Innovation and Sustainable Development*, Vol. 3, Nos. 1–2, pp.115–127.

Notes

[1]Contract No.: 004059 (GOCE) – MATISSE.

[2]We refer to all such procedures by the combined acronym (S) IA.