18

Integration

MARK VARDY

Overview

In the Sixth Assessment Report (AR6) of the Intergovernmental Panel on Climate Change (IPCC), the chapters of each of the three Working Groups (WGs) are structured with the intention of integrating 'cross-cutting themes' and 'handshakes' between them. While integration received special emphasis in AR6, it is not new. The IPCC has long considered how to treat issues such as representations of uncertainty and scenario data consistently across WGs. The IPCC's effort to integrate knowledge across WGs raises important epistemological and ethical questions related to how the humanities, natural sciences and social sciences shape understandings of climate change. To illustrate the theme of integration as applied within the IPCC, this chapter focuses on how risk is integrated across WGI and WGII in the AR6.

18.1 Introduction

The expectation of integration in the AR6 is clear in the vision statement that the IPCC Chair submitted to the IPCC's 46th plenary session, held in Montreal in 2017:

> Producing an AR6 which documents different levels of transformational societal changes requires different types of knowledge ranging from physical science, to ecological and economic sciences, to humanities and social sciences, as well as knowledge drawn from the practitioner community. This will require the experts involved in the scoping and writing exercises of the AR6 to undertake concerted multi- and interdisciplinary conversations, across-WGs but also intra-WGs, and to be mindful of the needs of the practitioner community, especially as the AR6 is meant to adopt a risk and solution-oriented framing. (IPCC, 2017a: 22–23)

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This integration of social and natural sciences and humanities across WGs – while considering practitioners and focusing on solutions – can be understood as 'anti-boundary' work; instead of maintaining boundaries between WGs, they are intentionally bridged (De Pryck & Wanneau, 2017: 206–207).

The emphasis in the AR6 on integrating knowledge within and between WGs is motivated in part by the imperative to provide policymakers with solutions-focused science. This could lead to reductionist or abstract generalisations. It could potentially strip away political-economic contexts in which climate change is produced and in which solutions might be implemented (Schipper et al., 2021). This problem can be put differently. If different forms of knowledge have different ways of understanding what the problems and appropriate solutions to climate change are, then there may well be disagreement between IPCC authors when it comes to integrating their home disciplines into a common framework (Schipper et al., 2021).

The implications of integration across WGs are discussed in the literature in reference to adaptation, mitigation, and development (Ayers & Huq, 2009; Nightingale et al., 2020), food security (Porter et al., 2019; Rivera-Ferre, 2020), and Negative Emission Technologies (NETs) (Beck & Mahony, 2018b). This chapter focuses on the topic of risk, and introduces the theme of integration by tracing the development – through informal and formal venues – of the approved AR6 chapter outline.[1]

18.2 A Typology of Integration

The tensions identified above by Schipper et al. (2021) can usefully be situated alongside the typology developed by Barry et al. (2008) in their study of 'the logics of interdisciplinarity', which draws from science and technology studies (STS), political theory and empirical case studies. Barry et al. (2008) articulate three ideal-typical modes through which a range of actors and organisations have attempted interdisciplinary work: service-subordination, integrative-synthesis and agonistic-antagonistic.

The *service-subordination* mode integrates knowledge through a 'hierarchical division of labour' that subordinates the social sciences and humanities to a framework established by the natural sciences. The expectation is that the social sciences will 'serve' the natural or physical sciences. It is plausible that some of the historical tensions between the cultures of the three WGs could be traced to this mode (see **Chapter 12**). However, the *integrative-synthesis* mode provides the dominant discourse through which interdisciplinarity is attempted in the AR6. This mode is characterised by the ways that 'social' factors (e.g. the economy) and nature are accounted for in the same model. Its prevalence in the IPCC is

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evidenced in the dominance of concepts of resilience, adaptive capacity and vulnerability, which each draw upon complexity theory and social-ecological systems theory. As Barry et al. (2008: 28) point out, the synthesis enacted in this mode can lead to closure, not 'new heterogeneous fields'. This speaks to the tension identified by Schipper et al. (2021) between a holism that imposes a totalising unity on the one hand, and the complex and deeply rooted ways that climate intersects with existing relations of power on the other.

The third mode discussed by Barry et al. (2008) is the *agonistic-antagonistic* mode. This draws from Chantelle Mouffe's concept of the role of opposition as a constitutive element of the political. In this mode, 'interdisciplinarity springs from a self-conscious dialogue with, criticism of, or opposition to, the intellectual, ethical or political limits of established disciplines or the status of academic research in general' (Barry et al., 2008: 29). In other words, the norms and assumptions of different disciplines are challenged as they are brought into conversation with each other. The agonistic-antagonistic mode highlights the potential for creative and novel ways of understanding and responding to climate change to emerge from the intermingling of received ideas. At the same time, it highlights the potential for incommensurability. For example, as discussed in **Chapter 13**, seeking to integrate Indigenous knowledge into a framework dominated by Western science might diminish the integrity and meaning of Indigenous knowledge by removing it from the context within which it is produced.

18.3 A Historical Snapshot: Networked Relationality, Uncertainty and the TGICA

Treating 'cross-cutting issues' consistently between WGs is a long-standing issue in the IPCC. For example, a set of four guidance papers produced over 20 years ago in the lead up to AR3 argued for the 'consistent use of terms and approaches to the assessment and reporting of information that is relevant to the cross-cutting issues' (Pachauri et al., 2000: 2). The four cross-cutting issues treated in the guidance papers were: costing methodologies; uncertainties; decision analysis frameworks; and development, equity and sustainability. Additional cross-cutting issues that were dealt with in special reports at that time were: integrated assessment; scenarios; biogeochemical/ecological feedback; and sinks (Pachauri et al., 2000: 2).

In their guidance paper produced for the AR3, Moss and Schneider (2000: 48) detailed how uncertainties are represented in different ways in previous assessments, and called for 'more explicit and consistent treatment of uncertainties in future assessments for all working groups'. Despite Moss and Schneider's

(2000) plea, however, uncertainty was not always treated in a uniform manner (see **Chapter 17**). As reported by the InterAcademy Council (IAC, 2010: xiv), WGs in the AR4 'used a different variation on IPCC's guidance to describe uncertainty'. This hampered the IPCC's ability to communicate uncertainty and, in the aftermath of the controversies of 2009–2010 (see **Chapters 3** and **6**), the IAC (2010: 69) echoed statements made in the cross-cutting papers with their recommendation for 'strengthening coordination across Working Groups where appropriate and productive'.

Despite the evident desire for integration, coordinating this across WGs is no easy task. Each of the three WGs has its own culture, which is not necessarily shared (Beck, 2011a; Fløttum et al., 2016). This is due, in part, to the IPCC's organisational structure. The IPCC has relatively few permanent paid staff members; at the time of writing, the Secretariat headquartered in Geneva had 16 positions, not including three interns. Each WG is supported by a paid Technical Support Unit (TSU) of a similar number, and each of the three TSUs is formed anew by different host nation states for each new assessment cycle. The work of actually writing the assessment reports is undertaken by volunteers who are selected for each specific report. Given this organisational structure, it is helpful to understand the IPCC as a 'network organisation' in which change can be mediated through key individuals (Venturini et al., 2022). Integration within and between WGs is worked towards through key individuals whose roles span more than one WG; they occupy what Venturini et al. (2022) call 'multipositional thematic bridges'.

Lead Authors, Coordinating Lead Authors, and IPCC Bureau members, which includes WG Co-chairs, can all provide bridges between and within WGs in both formal and informal spaces (see Figure 18.1). As depicted in the figure, informal spaces allow for interaction to build support for key concepts that can then enter the formal structure of the IPCC at Panel/WG plenaries.

The controversies of 2009–2010 heightened the need for transparency and consistent treatment of issues across WGs. This must have been on the minds of some of the roughly 50 individuals – many of whom act as multipositional thematic bridges – who participated in the 2016 IPCC Expert Meeting on the Future of TGICA (Task Group on Data and Scenario Support for Impacts and Climate Analysis). The meeting was convened to consider how the TGICA should respond to changing conditions, including the massive increase in computing power that had occurred since its inception. The TGICA was formed in 1997 as a reformulation of a similar group that had formed the previous year (Vaughan, 2016: 1). One of the main tasks of the TGICA was to coordinate and provide consistent scenario data to all three WGs. Another of its tasks was to provide input on 'cross-cutting issues' that were thought to be relevant to all three WGs (IPCC,

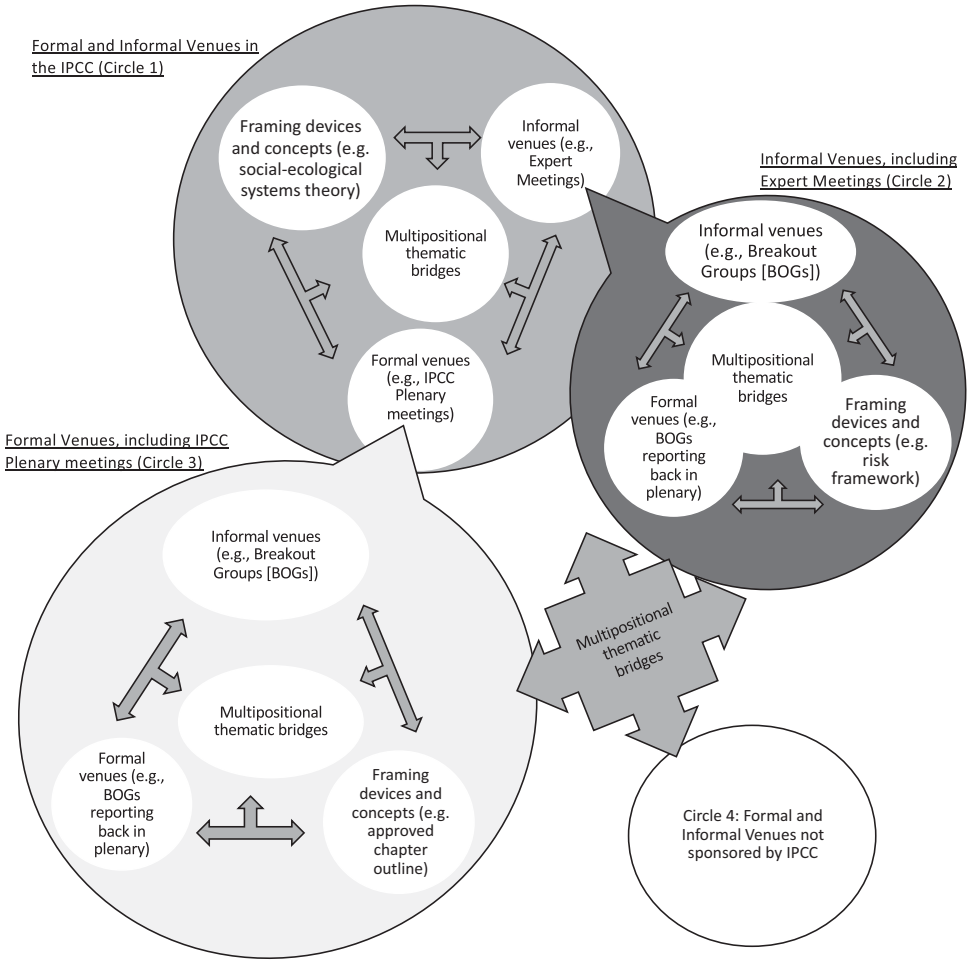

Figure 18.1 Networked integration.
Key actors who occupy multiple positions between and within WGs can communicate thematic framing devices and concepts in informal and formal venues. IPCC processes (Circle 1) include informal venues, such as Expert Meetings (Circle 2), and formal venues, such as WG/Panel Plenaries (Circle 3). This interplay between informal and formal venues takes place on a smaller scale within each type of venue. That is, both informal venues (Circle 2) and formal venues (Circle 3) include informal and formal elements. Thematic bridges, who occupy multiple positions in informal and formal venues, allow for framing devices and concepts, such as the risk framework, to be communicated between and within WGs. As indicated by Circle 4, venues outside of the IPCC can also be connected in this manner.
Figure made by the author

2018f: 13). As Vaughan (2016: 2) states in her report written for the 2016 Expert Meeting: 'Many current and past TGICA members cite its role in facilitating informal communication between Working Groups that does not have many other avenues for exchange as critically important'.

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The Expert Meeting on the Future of TGICA in 2016 was an informal venue (Circle 2 in Figure 18.1) that featured a series of plenary presentations and breakout discussion groups, one of which was titled 'Collaboration within IPCC – including facilitating interaction between Working Groups'. One participant noted that in AR5, it was left to individual authors to collaborate with other WGs. Several other participants noted that some LAs and CLAs in AR5 'had very little or no interaction with TGICA' (IPCC, 2016d: 14).

In 2018, two years after the Expert Meeting, the IPCC decided to rename the TGICA as the Task Group on Data Support for Climate Change Assessments (TG-Data) and change its mandate to focus primarily on the management of data and scenarios (IPCC, 2018d: 14–16). The TG-Data is not expected to be a conduit for integration; instead, with AR6, integration is structured into the outline of its chapters.

18.4 Achieving Integration through Informal and Formal Venues

The Scoping meeting for the AR6 was held in Addis Ababa, Ethiopia. There, themes and topics that were first addressed in venues that are outside of the IPCC's formal processes – specifically the meeting on Integrating Science across the IPCC on Climate Risk and Sustainable Solutions (Stockholm, Sweden, 29–31 August 2016) and the International Conference on Climate Risk Management (Nairobi, Kenya, 5–7 April 2017) – were brought inside the IPCC's formal processes via thematic bridges (Circle 4 in Figure 18.1). The AR6 Scoping Meeting in Addis Ababa included breakout group discussions that not only included topics and themes addressed in prior venues but that also, according to the Co-Chairs of WGI and WGII, 'provided a unique opportunity for the three WGs to coordinate the development of their respective assessments, [which is] critical to have early in a cycle where more integration across WGs is expected than in previous cycles, building on the cross-WG Special Reports that are currently underway' (IPCC, 2017c: 6).

The outline developed at the AR6 Scoping Meeting was approved in Montreal, Canada, in 2017 at the IPCC's 46th session, where the following cross-cutting issues were discussed in a series of breakout groups: Regions, Scenarios, Risks, Cities, Global Stocktake, Geoengineering, Adaptation and Mitigation, and Approaches and Processes for Integration (IPCC, 2017a: 7–13).

Integration was built into the approved chapter outlines for each of the three WGs. The final chapter of WGI, for example, 'Chapter 12: Climate change information for regional impact and for risk assessment' was intended to synthesise hazards identified by WGI for further integration into the risk framework in WGII. As stated by the WGI co-chairs report: 'this chapter will contribute to the hazard

component of a quantitative assessment of present and future climate risks, resulting in a key 'handshake' point between WG I and II' (IPCC, 2017c: 28). Integration is structured into the approved outline for WGII, in which the final cluster of three chapters synthesise previous chapters. The concluding chapter of WGII, 'Chapter 18: Climate resilient development pathways', was intended to act as a 'connection' to WGIII (IPCC, 2017d: 6). Another key 'handshake' was the online interactive atlas that was published in August 2021 (IPCC, 2021b).

After the formal adoption of the AR6 outline, the dynamic process of integration depicted in Figure 18.1 continued through the work of writing the AR6, which can be seen in the case of risk and regionalisation. As stated by the WGI co-chairs in their report for the IPCC's 46th meeting: 'Two major areas that require coordination across WGI and II are regional information in the assessment of climate mechanisms and linking climate variability and change and related uncertainties to the risk assessment framework' (IPCC, 2017c: 9).

The Expert Meeting on Assessing Climate Information for Regions, 16–18 May 2018, was held in Trieste, Italy, several months before the first Lead Author Meeting for AR6 WGI. The Expert Meeting reports:

> For the IPCC AR6 Working Groups main contributions to comprehensively inform regional risk assessment and decision making, it is important to evolve from the traditional one-direction approach … to a more integrated approach in which regional climate information, projections, vulnerabilities and impacts, and response options are considered altogether [across all three WGs]. (IPCC, 2018g: 11)

One of the main recommendations made by the meeting, which was structured around the familiar form of informal breakout groups and formal plenary sessions, was to: 'Make an improved and consistent use of the risk assessment framework across WGI and WGII, and regions' (IPCC, 2018g: 9). Indeed, the risk framework is a key way in which WGI and WGII achieve integration.

As made explicit in Figure 1.5 of AR6 WGII report, one of the significant differences between risk framework used in AR5 and that used in AR6 is the addition of 'response' along with the trio of hazard, exposure and vulnerability established in previous assessment cycles (Begum et al., 2022: 35; see also Simpson et al., 2021). In other words, the risk framework recognises the possibility that maladaptation contributes to the risks that humans experience.

18.5 Achievements and Challenges

To integrate WGs in the AR6, the IPCC explicitly pursues approaches that fall within the integrative-synthesis mode of integration identified by Barry et al. (2008) and that guided the risk and resilience frameworks that were structured into

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the approved chapter outlines. However, the networked quality of the IPCC means that integration cannot be achieved through top-down imposition. Actors occupying multipositional thematic bridges champion the vision for integration in formal and informal venues. But it is up to authors – Lead Authors, Coordinating Lead Authors, Chapter Scientists and Contributing Authors – to actually write the assessments. This means that, in the actual writing of AR6, the service-subordination or agonistic-antagonistic modes discussed by Barry et al. (2008) might be attempted by different individuals or groups (see **Chapter 12**).

The risk framework in AR6 represents an achievement of the IPCC. Several decades ago, the IPCC adopted a risk framework that centred on biophysical hazards. But as discussed earlier, the AR6 updates the risk framework to include human responses to climate change as an additional source of risk. As stated in the AR6 WGII Summary for Policymakers, 'the risk that can be introduced by human responses to climate change is a new aspect considered in the risk concept' (IPCC, 2022: 5). This extension of the IPCC risk framework to further include 'the social' should be seen as an achievement.

Another achievement accomplished in AR6 is the high degree of cooperation between the Co-chairs of the three WGs, which appears to be greater than that achieved in AR4 or AR5. Similarly, anecdotal information suggests that in AR6 more multipositional thematic bridges participated in LA Meetings for WGs *other than their own* than was the case in previous assessment cycles. These individuals are key to the success of the IPCC's attempt for integration, but they are also rare. It takes considerable social, economic and cultural capital to be able to communicate between different disciplinary paradigms. A challenge the IPCC faces is how to support those thematic bridges who better represent geographical and gender diversity. The scope of this challenge for the IPCC increases when Indigenous knowledge is included along with the humanities, and the social and natural sciences.

Some IPCC authors might censor themselves and not include text that they suspect might be opposed by governmental delegates. For example, there may be ample peer-reviewed evidence that political–economic contexts and social relations of power exacerbate the vulnerability of impoverished people to climate change. But it could be a challenge for IPCC authors to include such knowledge into an integrative framework in such a way that retains critical and political clout while also being approved by all government delegates (see **Chapter 20**).

Considering the challenges described earlier, the IPCC should confront the question of what can and should be done with incommensurable forms of knowledge that come from Indigenous Peoples or critical scholars. This knowledge may provide vital insight into the problem of climate change, but it may remain incommensurable with the IPCC's chosen integrative frameworks, posing significant ethical and epistemological challenges.

Note

1 Although not discussed in this chapter, IPCC Special Reports are another important venue for integration. For example, the SREX (2012) includes chapters co-authored by WGI and WGII authors, and the Special Report on Global Warming of 1.5 °C, or SR15 (2018), was the first time that authors from all three WGs collaborated to work on the same chapter. See Chapter 5.

Three Key Readings

Barry, A., Born, G. and Weszkalnys, G. (2008). Logics of interdisciplinarity. *Economy and Society*, 37(1): 20–49. http://doi.org/10.1080/03085140701760841

This article provides an empirically and theoretically grounded analytic framework for studying the various ways in which the natural and social sciences and the humanities are brought together.

De Pryck, K. and Wanneau, K. (2017). (Anti)-boundary work in global environmental change research and assessment. *Environmental Science and Policy*, 77: 203–210. http://doi.org/10.1016/j.envsci.2017.03.012

This article provides the historical and political context of the push for integration in the AR6 by tracing the development of discourses related to solutions-oriented science.

Schipper, E. L. F., Dubash, N. K. and Mulugetta, Y. (2021). Climate change research and the search for solutions: rethinking interdisciplinarity. *Climatic Change*, 168(3): 18. http://doi.org/10.1007/s10584–021-03237-3

This article, co-authored by scholars with extensive insider experience of the IPCC, provides a detailed and critical analysis of the imperative to integrate knowledge for solutions within the IPCC.