



An assessment of global agricultural assessments

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1 Introduction

The global food system¹ is widely and rightly seen as profoundly problematic and unsustainable, although characterisations of ‘the problem’, along with diagnoses, analyses and prescriptions vary significantly. Common features of many of those characterisations, which we share, include that something in the order of 1 billion people currently suffer chronic hunger and under-nutrition while a similar number are significantly over-weight or even obese. It is also widely recognised that the dependence on fossil fuels of much of agricultural production, food processing and distribution entails that as and when the prices of those fuels, and the energy derived from them, rises will need to be diminished. The food and agricultural system is also a major contributor to atmospheric concentrations of greenhouse gases such as carbon dioxide and methane. Despite some common ground, there are nonetheless multiple perspectives and competing accounts, and this Working Paper is a response to those important controversies. While we recognise that different groups of analysts and commentators develop and articulate their analyses in ways that may well make sense from their particular perspectives, and conflicts between perspectives are inevitable, it does not follow that ‘anything goes’ or that there are no good epistemic and/or normative grounds for choosing between. Our aim is to seek to understand and to explain the evident diversity, and also to identify and justify well-grounded judgements of the relative adequacy and credibility of competing assessments.²

One of the predominant themes in these debates has concerned the importance of the contributions that the development and application of scientific knowledge and technological innovations can make to address the challenges posed by the problematic characteristics of the global food system. For example in 2009 the UN FAO argued that:

“...globally the rate of growth in yields of the major cereal crops has been steadily declining. . . . The *challenge for technology* is to reverse this decline, since a continuous linear increase in yields at a global level following the pattern established over the past five decades will not be sufficient to meet food needs...” (FAO 2009)

While we accept that technologies have important contributions to make, we do not accept that the problems are primarily technological, or that technologies on their own can provide solutions. We are satisfied that the evidence proves that people currently starve even though we live in a world in which there is more than enough food produced to feed everyone, (if it was more equitably distributed); but that people starve because they are poor. Hunger is at least as much a socio-economic problem as it is a technological one.

¹ ...which is in turn composed of multiple regional, national and local food systems

² Cf P van Zwanenberg & E Millstone, ‘Beyond sceptical relativism: evaluating the social constructions of expert risk assessments’, *Science, Technology & Human Values*, Vol. 25, No 3, Summer 2000, pp. 259-282

This working paper is a response and contribution to debates about the problematic characteristics of the global food system, and to the proliferation of diverse and competing ‘assessments’, each of which purports to be definitive. We aim to explain firstly why many of the assessments profoundly disagree with each other? Our starting hypothesis was that their conflicting perspectives can be identified through and explained by their underlying up-stream framing assumptions. We set out, moreover, not just to identify and characterise those framing assumptions but also to adjudicate between them, in terms of their accuracy and their adequacy. Ambitiously, we aspire to contribute to debates concerning food and agricultural policies, but also more generally to enhance our understanding of the conditions under which it may be possible collectively to construct global knowledge-making for sustainability.

This is not the first attempt to understand the diversity of perspectives of the unsustainability of the global food systems, and we recognise that we have benefitted from earlier work by for example Feldman & Biggs (2012b) and Wise & Murphy (2012).

1.1 Assessing assessments

When, in the aftermath of the Second World War, a growing number of poor and ex-colonial countries were designated as ‘developing countries’, and when their ‘economic development’ became the central focus of public policies in, and for, those countries, many of the resultant policies were understood as involving transitions from an agricultural past to an industrial future (Willis 2005). To the extent that ‘agriculture’ was thought to remain important, it was widely thought of as in urgent need of ‘modernisation’ by way of ‘industrialisation’.

The ‘Green Revolution’ of the 1960s and early 1970s, which involved the introduction of ‘high yielding’ varieties of e.g. maize, rice and wheat, was widely portrayed and often understood as a technological success that transformed the productivity of farming in e.g. India, Mexico and the Philippines, by increasing the productivity of labour, land and capital. Although the impacts of the ‘Green Revolution’ were contested, especially by those who argued that while it may have increased the total amount of food produced, in circumstances where access to land, capital or irrigation were poor, and or inequitable, the transformation aggravated, rather than diminished, socio-economic inequalities in ways that impoverished many poor subsistence farmers and farm labourers. Critics argued, for example, that while the Green Revolution may have increased yield per unit of land, and increased the total size of the harvests, it may also have increased the numbers of impoverished and hungry people by amplifying, rather than diminishing, socio-economic inequalities. Those experiences showed that understanding the causes of, and remedies for, rural poverty and chronic under-nutrition cannot be understood solely by focussing on the aggregate level of supply, or the average amount of food per capita. Socio-economic and political conditions and their consequences for poverty are at least as important as aggregates and averages. That implies that any adequate perspective on the problem of chronic under-nutrition must therefore be multi-layered, focusing on both totals and patterns of distribution, and on socio-economic conditions as well as on crops, horticulture and livestock.

The apparent success of the Green Revolution in Asia and Latin America, and subsequent progress primarily in China is reducing the numbers of people suffering chronic under-nutrition,

resulted in the salience of food and agricultural issues diminishing in policy agendas, at both national and global levels. Despite several attempts to keep agriculture for development high on policy agendas, it faded from the view of many, in ways that reflect the growing 'urban bias' of development policies and initiatives (Lipton 1977).

The persistence of chronic hunger was however pivotal to the MDGs set in 2000, which included **Goal 1: Eradicate extreme poverty and Hunger: Target: Halve, between 1990 and 2015, the proportion of people living in extreme poverty.** By 2005-6 it was, however, clear that there was no realistic prospect of meeting that Target, let alone achieving the Goal (United Nations 2008).

It was the abrupt volatility of, and spikes in, global food prices during 2007-8 and in 2010-2011, which caused unrest in many parts of the world, both poor and wealthy, that forced agricultural and food issues back up global, regional, national and local policy agendas, and there has been renewed interest in agricultural research and development. Moreover levels of investment in agricultural and food research have increased from both national and multi-lateral organisations, while US-based philanthropic bodies such as the Bill and Melinda Gates Foundation have provided substantial funding to support agricultural development. (see e.g. (Bill and Melinda Gates Foundation n.d.)

Moreover a plurality of responses and assessments: Chronological: from e.g. WDR08 - World Development Report (2008) (World Bank 2007), the first time in 25 years that the WB's annual report focussed on food (Wise & Murphy 2012, p.7). "While there is broad agreement on the factors that contributed to the crisis, there is little consensus on their relative importance." (Wise & Murphy 2012, p.9)

In response to renewed global interest in the functioning and governance of the global agri-food system by a range of public and private international actors and organisations, the STEPS Food and Agriculture Team set out to appraise some of the most influential assessments of agricultural food policy, and the potential roles of science and technology that have been produced in recent years. This project firstly aims critically to examine the framing assumptions underpinning those documents and the actors and interests associated with them, and to inform and engage with current agricultural technology policy debates.

The analysis aims to provide answers to the research questions:

- 1) Why have the reviews and policy initiatives come to different conclusions?

This will be examined through three sub-questions:

- Can different framings of the problems be identified in different processes?
- If so what are they?
- Have different framings informed the issues selected for attention, competing policy proposals and recommended practices?

That discussion will then be complemented with a response to the question:

- 2) How do the assumptions, diagnoses and prescriptions perform when benchmarked against the criteria of: acknowledging and addressing directionality, diversity and distributional considerations?

This project has not aspired to being comprehensive, let alone exhaustive. Instead we have tried to capture the outline of the overall envelope of the debates. Consequently this Working Paper focuses on three assessments of agricultural science and technology and on three agricultural policy prescriptions that have emerged between 2008 and 2012.

The 3 assessments of agricultural technologies are:

1. International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD) (2009)
2. UK Foresight / Government Office for Science *The Future of Food & Farming* (2011)
3. UN Department of Economic and Social Affairs *Food and Agriculture: The Future of Sustainability. A strategic input to the Sustainable Development in the 21st Century (SD21) project* (2012)

The 3 policy documents are:

1. World Economic Forum New Vision for Agriculture initiative *Realizing a New Vision for Agriculture: A Roadmap for Stakeholders* (2010)
2. G20 *Action Plan on Food Price Volatility and Agriculture* (2011)
3. UN Committee on World Food Security *Global Strategic Framework for Food Security and Nutrition* (2012)

These documents were selected to provide representative examples from a range of different political, institutional and technical perspectives.

1.2 Criteria used for choosing the documents

Documents have been identified as either assessments or policy documents on the following basis: Either

- Documents arising from a consultative process, and which examine different technology (and governance) pathways have been considered to be assessments
- and/or
- Documents which assume technology and governance pathways in order to produce policy have been considered to be policy documents

The contrast provides a useful first approximation, although this division is not entirely clear-cut. For example, the UN Committee on World Food Security (CFS) document was produced through an extensive consultation process, but presents policy recommendations rather than an assessment of agricultural science and technology. Therefore, the documents have been considered together, with differences between processes and products discussed where relevant. The minimum criteria by which the assessments to be reviewed were chosen are:

1. That they provide diagnoses of the problems facing the global food system, and

2. Offer prescriptions as to how those problems can and should be addressed.
3. That they engage explicitly with choices concerning the directions in which agricultural and food science and technology are being developed, and should be developed.

The criteria by which policy documents to be reviewed were chosen are:

1. that they provide diagnoses of the problems facing the global food system,
2. offer prescriptions as to how those problems can and should be addressed, and
3. have emerged from bodies that are widely seen internationally as important, authoritative and influential.

1.3 Dimensions of our review and analysis

Our approach in this working paper is framed by several assumptions. **Firstly**, that there can be a range of different and potentially appropriate responses to the problem of chronic under-nutrition. What might be an appropriate pathway in one context might not be appropriate in others. **Secondly** that the ways in which pathways are described and defended will be influenced by underlying high-level framing assumptions. **Thirdly**, that those framing assumptions have both empirical and normative dimensions. And **fourthly** that it may be possible to identify some of those key assumptions, and that the differences between them may help to explain why different assessments articulate competing analyses and prescriptions.

Those theoretical and methodological assumptions were moreover coupled with some empirical claims. We take it as given that widespread chronic hunger and under-nutrition is now, and in the modern age has not generally been, a consequence of an aggregate scarcity. On the contrary, we take it that in practice, more than enough food is produced to feed everyone, at least if the available food was equitably distributed. We take it as given that chronic under-nutrition is a consequence of poverty not scarcity. (E Millstone, 2011)

The selection of assessments and policy reports, on which this working paper focuses were chosen and examined in order to identify answers to the following questions:

- What is their overall perspective on their characterisations of ‘the problem’?
- What are their underlying assumptions, problem diagnoses and prescriptions?
- How do they characterise the role of science and technology in addressing the problem?

Within those inquiries, we aim to:

- review areas of agreement and difference
- identify the balance of opinions
- identify and compare framing assumptions, and
- highlight internal inconsistencies.

An analytical distillation of the documents has been laid out in a matrix format (see Appendix 1), which informs the discussion in Section 2 concerning the similarities and differences between the approaches, findings and policy recommendations of the documents. While several of the

processes endeavoured to shoehorn and reconcile diverse views into a unified global perspective, our approach has been to unpack those competing perspectives, to reveal contests and to analyse, explain and critique their diversity.

We have developed our analysis by interrogating the reports, asking:

1. How have they framed the challenge of ‘sustainability’?
2. Have they examined the dynamic properties of the systems they discuss?
3. Have they explored multiple pathways towards more sustainable food and agricultural futures? If so how?
4. Have they analysed across multiple scales, integrated their analyses across those scales,
5. Have they analysed regimes of governance and the challenges they face? and
6. Have they have coupled their analyses with proposals for practical action?

1.4 Criteria of appraisal

This Working Paper both reports on the framing assumptions of the documents under review, but also appraises their assumptions, analyses and prescriptions, by reference to the three normative benchmarks that are constitutive of the STEPS Pathways Approach, namely their consideration of the conceptual ‘3-Ds’, namely ‘directionality’, ‘diversity’ and ‘distribution’(STEPS 2010). In the STEPS approach, those three concepts are defined in relation to technological and organisational innovations, asking what are they for?, who are they for? and “which – and how many – kinds of innovations are needed to address any particular challenge?” (STEPS 2010, p.9) Appraising claims about the functioning of the global agri-food system by reference to those conceptual benchmarks raises the following questions:

- **Directionality:**
 - Do the documents acknowledge that there are choices to be made about what goals(s) to aim for, and the directions of changes available and desired?
 - Do the policy recommendations aim to change the direction in which the sector is moving, or reinforce the current trajectory? What is the policy for, in which direction should systems change?
 - What are the ostensible and actual aims and objectives?
 - What would a sustainable food system look like?
 - What is to be sustained?
- **Distribution:**
 - Do they acknowledge the inequities in the distribution of food, access to food and food insecurities?
 - Do they recognise that many of the chronic-hunger-related shortcomings of the food system are not just problems of supply, but also access and equity, i.e. of poverty?
 - Do they focus only on aggregate levels of food production and availability, and neglect uneven ‘entitlements’
 - Do they consider possible inequities in the distribution of impacts of policy choices?

- Who is policy for? Whose interests will not be served by the policy not serve?
- Who gains and who loses?
- **Diversity**
 - Do the reports acknowledge diversity of stakeholders, agendas and interests, and if so, to what extent have they engaged with them?
 - Is there a recognition that needs, interests and predicaments are diverse?
 - Are smallholders farmers portrayed as if they are embryonic entrepreneurs (i.e. as aspiring ‘risk takers’) or is their need to diminish, or even avoid, risks appreciated?
 - Is there a recognition, or even an acknowledgement, that the needs of some must take priority over those of others?
 - Is there a recognition that different need, interests and predicament can benefit from different types of solutions and technologies? Or is it assumed that ‘one size’ fits all? Or even that ‘one size fits many, or most’?
 - Do the analyses assume or present a singular view of the future or a plurality of different possible futures?

The report will conclude by highlighting frameworks that engage appropriately with these key challenges, and with some reflections on the implications for global collective knowledge-making in relation to the change of enhanced sustainability.

1.5 Comment on methodology

This Working Paper provides a characterisation of the underlying framing assumptions for each document, by selectively highlighting revealing remarks, which are variously indicative, critical or prescriptive. They have been laid out in a matrix (see Appendix1) from which this document was derived. This analysis is not comprehensive, even less exhaustive, but is intended rather illustratively to highlight key features that are relevant to understanding the policy framings of the documents. The analysis is summarised and synthesised in section 2.3.

Two **caveats** apply:

The characterisation of the framing assumptions was based on a textual analysis of the documents. It was not been possible to take into account the dynamics and politics of the policy-making processes, or the process of negotiation and debate, that took place during the production of the documents, beyond evidence available from other authors. Our focus has been on the outputs rather than processes of production. Secondly, the process of identifying underlying framing assumptions cannot be entirely neutral or objective as it involves choosing which aspects of the reports are deemed intrinsic to and constitutive of the documentary narratives.

2 Comparison of framing assumptions

In this section, the points and terrain of convergence and divergence that characterise the 6 particular approaches, findings and policy recommendations are explored. Here, the six

documents are discussed concurrently, but whether there is a difference between assessments and policy documents will be discussed in Section 2.3 below.

2.1 Overview of the documents

This section contains an introduction to, and overview of, each of the 6 documents.

Assessments:

2.1.1 International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD) (2009)

In 2002, several years before most analysts gained an appreciation of the incipient volatility of global food markets, the World Bank and the UN FAO initiated a consultation on the need for an assessment of agricultural knowledge, science and technology (AKST). As a result, the IAASTD was established in 2004, with a remit to assess the role of AKST in “...reducing hunger and poverty, improving rural livelihoods and facilitating environmentally, socially and economically sustainable development.” (IAASTD 2009b, p.vii) A 4-year-long process ensued to develop an agreed review and strategic planning initiative (Feldman & Biggs 2012a), but a thorough one that included FAO Member States and many other stakeholder representatives; and some 400 authors contributed to the final reports. The IAASTD’s governing Bureau consisted of equal numbers of ‘geographically balanced’ representatives from governments and civil society organisations, who selected the experts to prepare the report. The IAASTD report consists of a Global Report and five sub-global reports. It combines historical analysis of the impacts of AKST on sustainability and development goals, and modelling of future alternatives to assess the impacts of different policy options on those goals (IAASTD 2009b, p.viii). The Synthesis Report draws together material from the Global Report and the Sub-Global reports. There is also a Global Summary for Decision-Makers. All the reports include a Statement that the Reports were not unanimously approved, and an Appendix outlining the reservations, as well as footnotes relating to reservations on specific passages by several governments. Our analysis of the IAASTD is based primarily on the Synthesis Report, with additional input from the Global Summary and parts of the Global Report.

2.1.2 Foresight Report (2011)

This is the final report of a UK cross-government 2-year long initiative, which started mid-2009. The Foresight Global Food and Farming Futures Project, was led by the Government Chief Scientific Advisor on behalf of DEFRA (Department for Environment, Food and Rural Affairs) and DFID (Department for International Development). The aim of the project was:

“to explore the pressures on the global food system between now and 2050 and identify the decisions policy makers need to take, today and in the years ahead, to ensure that a global population rising to nine billion or more can be fed sustainably and equitably.” (Foresight 2011a, p.9)

and to help policy makers decide “...how to balance the competing pressures and demands on the global food system...” (Foresight 2011a, p.4) It built on several earlier reports from the

previous five years, including IAASTD (2009), Royal Society (2009), World Development Report (2008) and the UK's All Party Parliamentary Group report on Agriculture and Food for Development (2010). It also commissioned "...over 100 peer-reviewed evidence papers..." from a wide range of disciplines and from around the world. (op cit p.4) These include 'Driver Reviews', 'State of Science Reviews', 'Regional Studies' and case studies. Evidence was supplemented by working papers and workshop reports (op cit p.207). It aimed to complement and build on the previous reports by taking a long-term, global approach which considered the food system as a whole, and its interaction with other policy spheres.

2.1.3 United Nations Department for Economic and Social Affairs (UNDESA) report (2012)

This report was the result of a study undertaken as part of the Sustainable Development in the 21st Century project, run by the UN Department of Economic and Social Affairs (UNDESA). The project solicited the views of over 60 "thought leaders" (Giovannucci et al. 2012, p.viii) from 23 countries, with the aim of exploring "... the choices available under different scenarios for the agriculture and food sectors". (op cit 2) The report starts from the premise that policy choices can be "...fundamentally divergent because they are typically grounded in specific world views" (op cit 3), which shape attitudes to problems and solutions and cause "... people with diverse values and politics... to have diverse interpretations of evidence and science" (ibid). It aims to identify areas of consensus, as well as acknowledging and opening areas of disagreement for debate.

Inputs were sought from 'experts' through focused questionnaires. The responses were then gathered together by four co-ordinators into representations of four distinct world views. Those four syntheses of the experts' opinions are presented separately, and then further synthesized to produce an overview chapter. The final chapter of the report highlights areas of consensus and disagreement from the four groups. The experts consulted, the questions asked, the way the responses were collated and how they were presented, were all decided by the project co-ordinator.

Policy documents:

2.1.4 World Economic Forum (WEF) report (2010)

'Realizing a New Vision for Agriculture: A roadmap for stakeholders' – WEF (2010) – is a brief document describing the outcome of an 18-month process led by major food industry transnational corporations (TNCs), including Cargill, Kraft and Monsanto. The process started in 2010, when WEF Africa was hosted by Tanzania. This led to the development of public-private partnerships, and the leveraging of private sector funds for the so-called Comprehensive African Agricultural Development Programme (CAADP). (Dreier 2012) Food industry TNCs then initiated a series of workshops and 'leadership-level brainstorming sessions' (WEF 2010, p.3) involving over 350 business, government and civil society leaders. The purpose was to address "... the major challenges of global food and agricultural sustainability..." (ibid) and to propose actions to fulfil "...a vision of agriculture as a positive contributor to food security, environmental sustainability and economic opportunity." (ibid)

An update, describing progress towards the vision, was produced in 2012 (WEF 2012) and there is some further information about the process available on WEF's website. The report's analysis is based primarily on WEF (2010) with additional input from WEF (2012) and the website.

2.1.5 G20 Action Plan on Food Price Volatility and Agriculture (2011)

In June 2011, at the instigation of the French Government, the Agriculture Ministers of the Member States of the G20 met for the first time under the G20 umbrella. The meeting was called in response to high and volatile world food prices in early 2011, and concern about increasing levels of food price volatility for globally traded agricultural commodities. The meeting aimed to build on initiatives taken (or at any rate proposed) at the global level in response to the food price crisis of 2007-8, such as those arising from the L'Aquila Summit of the G8 in 2009, the 2009 World Food Summit and the reformation of the Committee on World Food Security. The Action Plan arising from the June 2011 meeting prioritised increasing food production and addressing "...short-term excessive volatility..." (G20 2011, p.2). It was presented to G20 leaders in November 2011, and ostensibly adopted.

2.1.6 Global Strategic Framework on Food Security and Nutrition (GSF) (2012)

The Committee on World Food Security (CFS) was initially established in 1974 under the auspices of the UN's Food and Agriculture Organisation (FAO). It was initially created as an inter-governmental body in the context of rising food prices in the mid-1970s, but subsequently fell dormant until the aftermath of the global food price crisis in 2007-8, when it was re-convened and expanded to include a wider range of stakeholders. Its members are Member States of the UN, while participants include civil society organisations, agricultural research bodies, private philanthropic foundations and private sector organisations. It is supported by a High Level Panel of Experts, whose reports inform discussions within CFS. The GSF was produced through a process of negotiations amongst stakeholders at a series of plenary meetings, and the first iteration was produced in 2012. It aims to "...improve coordination and guide synchronized action by a wide range of stakeholders in support of global, regional and country-led actions to prevent future food crises, eliminate hunger and ensure food security and nutrition for all human beings"³. It built on initiatives such as the World Food Summit (2009) and the Millennium Development Goals. It was aimed at policy-makers in national governments and should be updated in the light of policy developments and new agreements reached in the CFS.

2.2 Comparison of problem definitions and proposed solutions

This section provides a narrative and comparative account of characterising features of the 6 documents. It aims to identify substantive differences in approach between the reports, in order to compare underlying framing assumptions and to answer the following questions:

- What are their overall characterisations of 'the problem'?
- What are their problem diagnoses and prescriptions?
- Which issues are selected for attention, and how are those issues treated?

³ <http://www.fao.org/cfs/cfs-home/global-strategic-framework/en/> accessed 11.10.13

- How do the reports characterise the role of science and technology in addressing the problem?

2.2.1 What is the central concern of each of the reports?

Our analysis of the six reports reveals a range of differing central concerns, some of which are in conflict with others. They are all concerned with increasing global food supplies, raising productivity, and with producing the required foods within environmental limits, although they account of those challenges diverge. All the reports agree on certain trends affecting the agriculture system. For instance, they all acknowledge that levels of demand have risen and are expected to continue to rise. They all acknowledge constraints on the availability of natural resources such as soil, water and energy, acknowledge that climate change can and will have impacts on agriculture, and they all mention waste in the food system. They also note changing governance structures in the global agri-food system and the increased role of the private sector at many levels along the value chain. The consequences of those trends are identified as hunger and malnutrition by Foresight and GSF, but GSF additionally identifies the non-delivery of a range of rights, while Foresight focuses on environmental impacts and their negative feedbacks.

However, the emphasis is different in each report: UNDESA prioritised working within environmental limits, and therefore explores ways of increasing food availability without necessarily increasing aggregate levels of production. IAASTD was primarily concerned with reducing poverty and hunger, and productivity increases are only relevant insofar as they contribute to those goals. WEF's focus was specifically (and almost exclusively) on increasing productivity and aggregate production. Foresight focused on sustainable production, championing the concept of 'sustainable intensification'. The G20 focused on market functioning and price volatility – taking markets at the global level as its unit of analysis, while neglecting distributional considerations, and assuming a direct link between improved market functioning and increased productivity. GSF's focus was not on increasing production *per se*, but on increasing the ability of smallholder farmers to produce, manage risk, retain their produce and use their produce to reduce food insecurity.

Foresight, WEF and G20 considered future pressures on the system such as climate change, increased population and changing diets to be inevitable. UNDESA and IAASTD suggested that policy changes could reduce demand for scarce natural resources (e.g. increased global meat consumption is not inevitable). GSF and IAASTD and (to a lesser extent) UNDESA also argued that a re-shaping of policies to address governance and right-to-food concerns could create a system more able to cope with future pressures.

WEF, IAASTD, UNDESA and Foresight all recognised that previous approaches had failed to address hunger and poverty, or take into account negative environmental impacts of production methods. They considered the past focus on productivity gains and farm outputs to the exclusion of other aspects of the agri-food system to have been detrimental to resource management, and acknowledged the multiple functions of agriculture, at least to the extent of considering ecosystem services provided by the natural resource base on which agriculture depends. Foresight identified prevailing failings in the food system, including levels of hunger

today and over-consumption, and its associated health problems. However, its main focus, along with UNDESA and WEF, was on the future functioning of the global food system, while IAASTD and GSF were more concerned with its current functioning. G20 took both a short and long term approach.

The breadth of factors considered relevant to the identified problem varied widely across the reports. G20 focused narrowly on agricultural food commodities; WEF took a systems approach, looking beyond production at other elements of the system such as finance, infrastructure, storage and markets. Foresight was concerned with the trade-offs necessary between multiple sectors, such as food, energy, health and environment. UNDESA called for an examination of outcomes in terms of nutrition and access to food as well as internalising externalised environmental costs. IAASTD took a broader approach, calling for a focus on the ways in which productive systems interact with social and environmental systems in order to develop policies which address the needs and interests of the poorest and most vulnerable. This included factors such as trade regimes, intellectual property rights, occupational health policies and many others which interact with different functions of the agriculture system. GSF similarly took a multi-sectoral approach (CFS 2012, p.18), looking beyond the food and agriculture sector to a wide range of interacting factors.

The different goals identified by the reports lead to different choices about the types of changes that are desirable in the agricultural sector. WEF was concerned to increase global food supplies by increasing the productivity of smallholder farmers, having acknowledged that the limits to yield increases have probably been reached in industrialised countries (op cit p.10). In order for this additional production to reach global markets, smallholder farmers must be integrated into global value chains: subsistence production by marginal communities operating outside market structures does not fit with the WEF model, even though increasing productivity at farm level would reduce hunger.

UNDESA was most concerned to put forward policy recommendations which can address sustainability concerns, but with a focus on reducing poverty and hunger. IAASTD's focus on development and sustainability goals, rather than agricultural outputs, lead to a range of options actionable at multiple levels by multiple stakeholders, which are context-specific and directed to achieving the outcomes of reducing hunger and increasing livelihood options within environmental boundaries. Conversely, the G20 did not acknowledge the different contexts within which policy recommendations will be implemented, focusing primarily at the global level on agricultural commodity markets; and does not call for any changes to the current system beyond increasing transparency and market efficiency. Foresight called for a radical re-shaping of the food system, though overall it took a 'productionist' position. However, it recognised that agricultural production is not the only factor affecting hunger (CFS 2012, p.26), and that increasing production is not by itself enough to address the problems it had identified. GSF, like IAASTD, focused on outcomes rather than outputs, and called for an approach which put a range of social and economic rights at the centre.

2.2.2 Problem bounding

An examination of how the core problem was characterised and bounded in each report is key to understanding their underlying framing assumptions. What issues were considered relevant to ‘the problem’? What was considered outside the scope of the issue or outside the remit of the organisation? For example, despite similar concerns about increasing productivity within environmental limits, the reports presented very different understandings of the types and purposes of productivity increases and the types of environmental limits with which they were concerned.

The G20 report focused narrowly on the agriculture sector and on agricultural production in particular. It considered interactions between agriculture, trade and finance, but did not consider interactions with any other sectors, such as health or energy. Similarly, UNDESA and WEF took a sectoral approach and examined the functioning of the agriculture sector but did not look beyond it to interactions with policies affecting other sectors such as energy or land use.

Foresight, GSF and IAASTD all took a food systems approach, identifying and addressing factors beyond the agriculture sector which impact on food security and hunger. Foresight considered the food system as a whole, and called for policy coherence across multiple sectors. It considered social and cultural attributes of food, and took a comprehensive approach to human health, considering over- as well as under-consumption to be a problematic outcome of the prevailing disfunctionality of the global agri-food system. Similarly, although the role of the GFS was limited to recommendations on food security and nutrition strategies, it focused on policy coherence, and policy recommendations “...with a direct or indirect impact on food security and nutrition, such as trade, agriculture, health, environment, natural resources and economic or investment policies” (CFS 2012, p.6), thereby taking a broad approach to its remit. IAASTD examined factors affecting sustainability and development goals, rather than examining only agriculture sector goals, leading to an examination of how policy choices impact on a wide range of environmental concerns, social equity issues and considerations of human well-being.

The reports delineated the boundaries of the agricultural sector differently: WEF defined it narrowly, considering biofuels and forestry as separate sectors. UNDESA also considered biofuels as a separate sector, but included some analysis of the ways in which the two sectors interact, exploring the relationship between biofuels, agricultural production and the energy sector more widely. G20 defined food security in terms of “sustainable agricultural production”(G20 2011, p.1) and highlighted environmental concerns relating to land, water and biodiversity. Wider issues of health and biodiversity were considered only in terms of setting up systems to protect against health and biological threats and to “facilitate trade flows”. (op. cit. 7) IAASTD, Foresight and GSF included forestry, fisheries and other rural livelihood activities as being part of the sector(s) under consideration. GSF took a broad view of which factors in those sectors were relevant to food security, for instance stressing land tenure rights and actions to combat illegal and unregulated use of natural resources.

GSF bounded the problem in terms of access to justice and the upholding of a range of rights, such as tenure rights. For instance, it took into account the impact of all forms of gender-based discrimination on food security, including the legal status of women, maternity rights, and the

design of programmes, policies and strategies to ensure equal access of men and women to agricultural investments. GSF placed food security concerns within governance frameworks, stressing the importance of embedding food security and nutrition goals into national and international legislation and policy-making. Conversely, G20's approach was bounded by a focus on the functioning of international commodity markets, including through strengthening WTO and widening engagement with WTO rules. The report placed a high priority on engaging with, and strengthening the role of, the private sector in developing countries, while civil societies were barely mentioned; humanitarian needs were considered as a separate issue, to be addressed through ensuring food supply in times of emergency (G20 2011, p.4).

Foresight took a broadly productionist position, but recognised that increasing production would not, by itself, address the problems identified. By taking a food systems approach it incorporated increased production as one element in a range of solutions. However, those solutions operate within current global market structures, with continued globalisation taken as a given, and even necessary:

“... a globalised food system...improves the global efficiency of food production” (Foresight 2011b, p.13)

It thus located decisions on food security specifically in the frame of the international trade system, though acknowledging a need to reform the trade system to take into account sustainability concerns.

Role of science and technology

The role of science and technology was identified differently across the reports, depending on their perspectives. For instance, Foresight and G20 characterised the purpose of research as increasing productivity, though Foresight located that within concerns about environmental resources, championing the concept of ‘sustainable intensification’. IAASTD considered the role of science and technology should be primarily to find ways to meet the needs of resource-poor farmers; WEF discussed how technology could improve market efficiency. The reports presented different accounts of the types of research thought to be needed and where they would be produced. WEF assumed a top-down process of technology development and transfer, focusing on “point interventions” at specific places in the system (WEF 2010, p.14) and with private sector involvement at all levels. UNDESA supported the development of structures that would enable the growth of technologies “... appropriate to scale and conditions...” (Giovannucci et al. 2012, p.62) and which could build on indigenous knowledge and technologies. However, there were no details about what such technologies might be, and there was no consensus across the report’s sub-groups regarding specific technologies such as GM crops. IAASTD called for research and technology at all scales to take into account the specifically societal outcomes of technological interventions. For instance, IAASTD considered the potential negative impacts of IPR systems, which might drive up costs, restrict other research, and adversely affect traditional food security strategies such as seed saving.

G20 was contradictory about where and how knowledge might be produced. It specified that: “...;we also insist on the need to enhance the transfer of the research results and technologies to farmers and to ensure that research activities respond to their needs and concerns and involve farmers in that process...” (G20 2011, p.4) thus calling for both top-down and bottom-up

models of research in the same sentence, and without indicating how either (or both) models might be developed in practice.

Although all the reports agreed on the need for more research and investment in the agriculture sector (both public and private), how this would be targeted differed. (IAASTD 2009b, p.4) called for research to be targeted to the needs of those currently excluded: "... to reduce poverty and provide improved livelihoods options for the rural poor..." AKST should not just be focused on the output of increased production, but on the outcome of increased food security. WEF focused on globally-developed technologies to address specific points of bottleneck in the value chain. UNDESA suggested choosing policies to enable the adoption of technologies and innovations developed at the grassroots (Giovannucci et al. 2012, p.62). GSF noted the importance of agricultural research, but the types of technology and knowledge that are valuable were not explored (CFS 2012, p.16), nor were the institutional arrangements for knowledge production. It prioritised smallholder sensitive investments, but did not discuss how technology should be used, by whom, or to what end. By contrast, G20 identified specific technologies such as plant breeding (G20 2011, p.5) to be supported through research. It mentioned the importance of 'orphan' crops, but actions centre on the major commodity crops, wheat and rice.

WEF acknowledged that spot technologies need to be context-specific, but nonetheless prioritised identifying appropriate technical fixes for specific (technical) problems, which would be identified by researchers and handed down to farmers. IAASTD specifically critiqued that approach to agricultural science, with its focus on "...delivering component technologies to increase farm-level productivity..." (IAASTD 2009b, p.17) and instead called for a radical overhaul of agricultural research and technology to direct it to the need identified by the farmers themselves. In particular, the IAASTD stressed the role and value of traditional and local knowledge and called for farmers and researchers to work together to identify solutions that would take into account the full range of factors affecting the farmers' livelihoods.

UNDESA and Foresight also valued local and traditional knowledges. UNDESA looked at scaling up 'solutions that work', while IAASTD emphasised enabling local applications and effective use of multiple sources of knowledge. Foresight stressed using existing knowledges and technologies effectively as well as investing in research into future possibilities. It stressed the importance of "...using existing knowledge..." (Foresight 2011a, p.11) and highlighted the inability of one technology alone to solve the problems facing the food system. It considers what could be done now and in the future with existing technologies, rather than hoping for some future 'silver bullet'.

IAASTD and Foresight both focussed on the costs, benefits and trade-offs associated with any policy choices about technology use, but IAASTD was more clearly focused on the societal outcomes desired, while Foresight prioritised environmental sustainability, with less attention to social, ethical and equity issues in relation to the use of new science and technology. IAASTD was the only report explicitly to consider issues of control and ownership in relation to new research and the consequent innovations.

The Foresight report was often transparent about the way in which it had used the evidence it had gathered. For instance (Foresight 2011a, p.14) noted that standard population growth figures are contingent on a range of assumptions and expectations, and constitute the best available ranges of projections at the time the report was written. Similarly, it noted uncertainties in figures and evidence on a range of topics such as future *per capita* consumption and the effects of climate change. It highlighted the difficulty of making policy choices when the costs and benefits of different policy options cannot be robustly evaluated. It thus presented a different approach to the use of research and science in policy making than some of the other reports.

However, even though it was transparent in its approach to balancing the evidence available, it is less clear how the evidence considered had been chosen. For instance, the State of Science Reviews commissioned did not include a review of research on agro-ecology. Similarly, WEF's and G20's focus on market functioning circumscribed the evidence considered relevant to solving the identified problem.

2.2.3 Issues selected for attention and how they were treated

Within the problem-boundings outlined in 2.2.2, the reports focussed on a range of issues that impact on the core problem they identified. While there was some overlap between the reports on issues they deemed relevant, their treatment of those issues differed markedly. This section examines how the different reports treated a selection of key issues, including those deemed important in previous STEPS work.

1) Markets and food price volatility

Market functioning was an issue of concern in all the reports; it was central to the analysis of WEF, G20 and Foresight. Markets were considered at two levels – globally and within individual countries. Local effects included bottlenecks in market functioning along value chains, which limit the ability of smallholder farmers to participate in markets, and the impact of market volatility on the financial risks that smallholder farmers might take. While those considerations may be important, a narrow focus on small-scale farmers who are able to invest to increase yields and participate in the market (e.g. in UNDESA, WEF, G20) served to preclude any consideration of the impact of market-based policies on the most vulnerable groups who are too poor, and too poorly connected, to benefit from market-based growth.

The importance of functioning global markets to food security is stressed by all the reports, but in conspicuously different ways. GSF, IAASTD, UNDESA and Foresight are concerned about distortions in the multi-lateral trading system, which adversely affects developing countries, while the G20 focused on poor regulation of agricultural, financial and commodity markets. IAASTD noted that prevailing global trade and market systems have “major distributional impacts” (IAASTD 2009b, p.10), while trade regimes and agricultural subsidies in industrialised countries were barely discussed by G20. WEF, UNDESA, IAASTD and Foresight all called for a rethinking of trade tariffs, but framed their objections rather differently. WEF considered subsidies to affect the efficient functioning of free markets (WEF 2010, p.22), while UNDESA, Foresight and IAASTD were concerned with the problems of small-scale farmers faced with unfair global competition.

Foresight, WEF and G20 adopted a market-based approach to food security; the G20 focused particularly on the functioning of global trading systems. Whilst Foresight highlighted uncertainties and unknowns on many issues, it was unequivocal about participation in global markets. It stressed the "...importance of liberalised trade to the efficiency of the global food system..." and advocated "...liberalised international trade in food..." because this "...will help to dampen volatility." (Foresight 2011a, p.110) It stated:

"...it is essential that mechanisms are put in place to give governments the confidence in the global trade system to resist what will often be intense political pressures to impose export restrictions at times of high food prices." (Foresight 2011a, p.110)

This implies that the free functioning of the market was a higher priority for the Foresight team than citizens' access to affordable food, or an individual country's internal democratic processes. At the same time, it noted that "...the market alone will not achieve what is possible," (Foresight 2011b, p.19) which suggests a lack of consistency in its understandings of the impact of markets on food security.

Food price volatility was the core focus of the G20, but was barely considered by WEF, GSF or IAASTD. Foresight acknowledged that judgements about what is an acceptable level of food price volatility is a political judgement, but examines how to reduce "...the element of volatility that does not reflect underlying market fundamentals." (Foresight 2011b, p.23) This implies that addressing volatility is purely about free market functioning rather than about reducing hunger. It suggests a safety net approach to deal with market failures and support for those unable to participate in markets.

GSF (CFS 2012, p.17) considered that reserves of staple foods could be used to mitigate market price volatilities, but the G20 and Foresight were both concerned that holding and trading food reserves might distort markets, though they did acknowledge their potential value at a national level in times of humanitarian emergency (Foresight 2011a, p.168), (G20 2011, p.4). They both opposed the idea of using food reserves under 'normal' conditions, for instance in the context of price stabilisation. Foresight considered reserves to be a last resort, but at the same time acknowledged that low global stocks were a factor contributing to food price volatility in 2007-8 (Foresight 2011a, p.106). UNDESA, WEF and IAASTD made no mention of the use of reserves at all.

2) Smallholders and other stakeholders

Smallholder farmers are a concern of all the reports, to differing degrees. This renewed interest in their role in agricultural production could be considered a shift in the discourse on food security after many years of neglect (World Bank 2007). GSF focused on smallholders' rights, while the G20 only considered smallholders within the broader category of private sector actors. While there was general agreement on factors affecting smallholder farmers' abilities to participate in markets, the reports placed different values on the role of markets to livelihoods. For instance, IAASTD addressed how to support all rural livelihoods, including those of marginalised, resource-poor farmers unable to access markets.

Conversely, WEF's concern to increase global food supplies shaped its approach to smallholder farmers. Assuming an urgent need to increase their productivity, and in order for the additional production to reach global markets, smallholder farmers must be integrated into global value chains: subsistence production by marginal communities operating outside market structures did not fit with the WEF's model, even though increased farm-level productivity of smallholders would reduce hunger for those communities. UNDESA also looked to ways of engaging productive farmers in the markets, but focused on high-potential areas. Foresight considered supporting smallholder agriculture to be just one of a range of possible ways to increase agricultural production, but one that is particularly important for addressing hunger and poverty (Foresight 2011a, p.120). But GSF stressed the idea of "smallholder-sensitive investment in agriculture" (CFS 2012, p.14) leading to a consideration of issues otherwise often ignored, such as land tenure.

Relationships between the public and private sectors, and the role of civil society were viewed differently in each report. GSF considered 'non-state actors' to have an important role in ensuring that rights are upheld and protected (CFS 2012, p.23), while WEF considered civil society's role as the provision of safety nets for those excluded from the benefits of the market system. Citizens were invisible in the G20, while Foresight assigned different roles to consumers and citizens, but no role for 'civil society' except as a partner for government and the private sector.

All the reports recognised women and youth as special categories of stakeholders in agriculture, but took different positions on their roles within the sector. WEF's approach can be characterised as assuming that the private sector will take the lead in designing and delivering a functioning food system (to meet the needs of business), and other actors/stakeholders will play instrumental roles as required. For instance, governments will provide enabling policy environments and infrastructures; civil society will provide safety nets for marginalised communities excluded from markets; smallholder farmers will provide the inputs at the start of the value chain; and women will provide a healthy workforce by ensuring adequate nutrition to their families.

In stark contrast, IAASTD focused on the agency of women and farmers in the global agri-food system, presenting a far more nuanced and detailed understanding of the impacts of changing structures in the food system on women and communities. IAASTD's approach centred on the ways in which the agri-food system might be re-shaped to meet the needs and interests of the poorest and most vulnerable. GSF considered multiple factors affecting women's participation in agriculture, including access to productive resources, financial and legal frameworks, health, education, gender-based violence and maternity rights (CFS 2012, p.18).

3) Nutrition

Alongside a renewed focus on smallholders, there was an emerging consensus that nutrition is an important element of food security. While this had long been part of the WFS definition of food security (WFS 1996) it has been taken up more widely in recent years, and can be considered a

shift in the discourse on food security. For instance, (IAASTD 2009b, p.9) noted that health is “... not generally an explicit goal of agricultural policy”, but the GSF is explicitly designed as a strategy for food security and nutrition. Although all the reports considered nutrition and health issues, WEF and G20 limited their concern to under-nutrition in developing countries, while Foresight, UNDESA and IAASTD also explored the health problems caused by decreasing dietary diversity and food quality in developed and industrialising countries, and consider the impact of increasing global demand for resource-intensive foods.

4) Aid / social safety nets, equity and social justice

The reports approached the needs of vulnerable communities from two angles: the global provision of aid and humanitarian assistance, and the national level provision of social safety nets. This reflected a separation of the goals of food and agriculture policy between outputs – increased food production – and outcomes – fewer hungry people. Dividing policy outcomes between humanitarian concerns and the ‘normal’ functioning of the food system, however, begged the question of whether the reports considered reducing hunger to be the core desired policy outcome. IAASTD and GSF were the honourable exceptions, though GSF favoured a twin-track approach to addressing short- and long- term problems at the same time. IAASTD described asymmetries in development, and the disproportionate effects of changes on the poorest and most vulnerable, highlighting its position that social protection is not an add-on but a policy focus. It called for a reshaping the global food system specifically to enable development goals to be reached. It thus included consideration of how to increase productivity in a sustainable manner, which included social welfare, cultural dimensions and the empowerment of marginalised groups. GSF took a rights-based approach and also considered the needs of countries in protracted crises, which the other reports did not consider at all.

Foresight discussed trade-offs between different policy options, but did not examine equity issues or distributional concerns within that e.g. (Foresight 2011b, p.22). The G20 suggested specific concrete actions to support food aid; UNDESA suggested that public services could be provided by the private sector, while GSF stressed role of the state in the provision of social safety nets (CFS 2012, p.16). UNDESA included equity issues as a concern in the narrative part of its report, but none of the nine recommendations addressed this issue.

5) Sustainability

IAASTD defined ‘sustainability’ broadly, considering social, economic and cultural sustainability, and making the sustainability of rural livelihoods central to its analysis. WEF and UNDESA defined ‘sustainability’ solely in terms of environmental resources, with WEF taking a narrower set of parameters than UNDESA, namely GHG emissions, water, soil use and biodiversity. The G20 took a similar approach, but was also concerned about the sustainability of the investment environment (G20 2011, p.2). GSF linked environmental sustainability directly to social and economic sustainability (CFS 2012, p.20) and called for improved land tenure governance to help poor people access natural resources sustainably.

Foresight spelt out its use of the term ‘sustainability’(Foresight 2011a, p.31), which included inter-generational considerations, but not social or cultural sustainability. It discussed the political decisions required to balance competing demands on natural resources, for instance juxtaposing food supply and ecosystem services against each other. In contrast to GSF it presented a dichotomy between biodiversity and the needs of the poor rather than examining policy options that could address and reconcile both.

IAASTD, UNDESA, Foresight and WEF agreed that prevailing arrangements did not incentivise the private sector to pay for public goods, specifically the externalised environmental costs of industrialised production methods. This issue was not mentioned by G20 or GSF.

6) Future pathways

IAASTD’s overall approach was to suggest policies that engage smallholders, enable participation and democratise knowledge generation and sharing. However, no single pathway was identified to accomplish this. Instead, multiple pathways for different contexts were presented. Regional differences were recognised and the need for different policies to support food security in different contexts was stressed e.g. (IAASTD 2009b, p.65). This was also recognised by GSF, which stressed the importance of country-led processes e.g. (CFS 2012, p.6).

UNDESA recognised the possibility of multiple pathways to sustainable food production, recognising that context matters and that “...there is no one-size-fits-all approach.” (Giovannucci et al. 2012, p.14) It also noted that factors affecting the direction of developments in the food sector will “...respond to policy signals...” (op cit:13) and, like IAASTD and GSF, considered that it was possible for decisions to be made to move along different pathways from the current trajectory.

WEF and G20 took a systems approach to addressing problems in the food sector, but not a multi-sectoral approach. They prescribed a single pathway – a top-down, technocratic, market-based approach – but acknowledged that different technical solutions to generic problems will be needed in different contexts.

Despite rhetoric to the contrary, Foresight also put forward a single model of development, in which a country’s economic development would depend on moving from agricultural subsistence to urban industrialisation and participation in global markets (Foresight 2011a, p.98). Debates about trade-offs between policy options and multiple approaches to addressing food security were confined within that model of development.

7) Scales and governance

While all the reports agreed on the need for country-level responses, WEF, G20, and to an extent Foresight all focused on global aggregate food production, and on ways of bringing smallholder farmers into the global food system. WEF set targets for achieving the stated goals at global or national level (WEF 2012, p.24), and acting at scale was repeatedly stressed. For instance, village level civil society interventions were described as valuable examples of an

approach that can be scaled up. (op cit:18) The impact of policy recommendations at village level was not considered.

G20's focus was at international and national levels, with little recognition of diverse impacts across communities. For instance, its geo-monitoring initiative (G20 2011, p.19) would be of little value to small-scale farmers, who are unlikely to be able to access the information it may provide. This lack of analysis of scales led to the development of initiatives that could disadvantage small-scale farmers (IAASTD 2009a, p.19). G20 also mixed actions and results at different scales, for instance stating: "To strengthen global food security, steps must be taken to improve access and availability of safe and nutritious food for the most vulnerable..." (G20 2011, p.1) thus linking the provision of local and global food security in reverse causality.

Foresight took a global level, system-wide approach to issues such as the impact of climate change on food production and mentioned only briefly how these might affect different groups (Foresight 2011a, p.136). The focus of policy interventions was on low and middle income countries, primarily at national level. (see eg discussion starting op. cit. p.116)

GSF took a more scale-sensitive perspective, considering global and local linkages such as the impact of global market price volatility on small-scale farmers and on consumers (CFS 2012, p.15). It considered actions at national and regional levels, with a focus on how policy and governance at international level could support country-led initiatives.

IAASTD examined local, regional and global perspectives, noting the need to emphasise different aspects of the problems facing the agri-food system in different regions (IAASTD 2009b, p.21). It noted the need for shared approaches, collective agreements, and concerted actions across multiple scales and different social contexts.

8) Dynamic system properties, including how policy processes characterise risk and uncertainty

A failure to take into account the complex dynamics within the food system, and dynamic interactions between systems, could lead to a narrow analysis of risk and uncertainty. This can be seen in the G20's approach that focused on financial and market risk at the international level (G20 2011, p.3). It did consider the impact of risks associated with food price volatility on vulnerable communities and households, though tools to address this remained at the national level. However, its focus on aggregate food supplies ignored the impact of policy options in diverse contexts.

All the reports identified risks and uncertainties at the global level, in particular food price volatility and the unknown impacts of climate change. UNDESA additionally considered the risks posed by decreased biodiversity and increased supply chain concentration, both to human health and the resilience of productive resources. Foresight considered uncertainties in available evidence, such as projections of population and consumption patterns (Foresight 2011b, p.14), and took into account both complexity within the food system and the interaction of the food system with other systems. WEF considered the dynamics of the food system in isolation from

other markets or systems, and primarily considered market risks, but also discussed uncertainties, for instance over the impacts of changing patterns of land use (WEF 2010, p.13). IAASTD acknowledged a wide range of areas of uncertainty, including scientific, political and social uncertainties, noting that dynamic interactions within and between systems meant that policy outcomes may be unknown. It stressed the unequal distribution of risks across different sectors of society, including the variable impacts of policy choices on different groups. Similarly GSF examined risks at multiple levels including marginalised communities, and considered the dynamics of change within the food system by considering the connection between long term food security and crises such as conflict and famine (CFS 2012, p.24).

9) Practical actions

All the reports provided many recommendations for multiple stakeholders, but fewer concrete actions. GSF's recommendations were mainly framed in terms of taking a rights-based approach, supporting country-led processes and addressing governance issues highlighted earlier in the report. The G20 listed many issues that need addressing, but only committed to four specific actions. WEF addressed its recommendations for action to global business, government and civil society leaders, while Foresight contained a large number of recommendations for action across multiple sectors.

Foresight, GSF and G20 did not disaggregate responsibility for action, but instead largely focused on international governance, and actions by international bodies, with few recommendations addressed to specific actors. Similarly, IAASTD did not target or prioritise actions because it considers that they need to be taken at different levels by different bodies, and solutions include differentiated responsibilities e.g. (IAASTD 2009b, p.52).

The reports did not demand action from others that they cannot enforce, but the difference between recommendations and concrete actions highlights the gap between what was considered as necessary action and what it was within the authors' power (or interests) to do. For instance, WEF noted that "...equitable human development...involves targeting those below the poverty line..." (WEF 2010, p.13) but gave no indication of how this might be done, or by whom. GSF stressed the need to embed Right to Food legislation within international governance frameworks, thus creating a mechanism for action. Conversely, Foresight's discussions on reducing waste and consumption in industrialised countries used the language of encouraging action from the private sector, rather than creating institutions or legislation to make action happen.

2.3 Identification and comparison of framing assumptions – change this title

Drawing on the analysis in the matrix, and the different approaches to key issues discussed above, this section characterises the framing assumptions and normative perspectives underlying each of the documents.

In addition, it addresses two questions:

Does the type of document affect the framing?

Does the process by which the document is produced affect the framing?

2.3.1 Summary of framing assumptions

2.3.1.1 International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD)

The IAASTD report is framed by an assumption that benefits of AKST have so far been unevenly distributed, and have privileged the more powerful and richer. The direction of the global agri-food system has, moreover, been shaped by those with the power to do so, and choices about priorities for research and investments have been based on a developmental model designed in industrialised nations, which developing countries have been expected to adopt, even though that approach disregarded local knowledges, cultures, interests and ecosystems. National and international policy instruments have similarly been inequitable, as demonstrated by trade rules, (IAASTD 2009b, p.70) agricultural subsidy policies in industrialised countries (op cit:32) and the relative value of different international instruments (op cit:74). By focusing on production and profit, not sustainability and developmental goals, the current agri-food system has actively created the social, health and environmental problems now confronting both developing and industrialised countries.

2.3.1.2 Foresight Report

Foresight presented a detailed picture of the complex interactions within the food system and beyond, contextualising the food system and making links across sectors. It discussed how new technologies might be appraised, the role of different stakeholders and how different framings of a problem affect how the problem is understood (Foresight 2011b, p.28). It recognised that policy design involves "...social and political choices, in a contested space..." with different interest groups putting forward their positions. (op. cit. p.16) It stressed the need to balance competing demands, and framed the problems facing the food system in terms of trade-offs, particularly between food production and ecosystem services, 'biodiversity' and 'the needs of the poor'(Foresight 2011a, p.146).

The report called for, and suggested that it is presenting, a radical new approach to sustainable food production and food security. It asserted that "...hunger and poverty reduction are central...". (Foresight 2011b, p.25) But it located the 'contested space' within which policy choices are made to one constrained by the boundaries of a globalised market economy. It placed decisions concerning food security within the frame of the international trade system, and did not consider any need to intervene regarding the concentration of corporate power. At the same time it noted that "...the market alone will not achieve what is possible." (op. cit. p.19) The report seemed to have been built on multiple, conflicting, underlying framing assumptions, but instead of presenting a range of perspectives and policy options, it placed these perspectives in opposition to each other, closing down possible approaches which could incorporate and support different pathways to food security and sustainable production.

2.3.1.3 United Nations Department for Economic and Social Affairs (UNDESA) report

UNDESA specifically presented the perspectives of four different 'world views', bringing them together in an overview chapter, and concluding with a description of areas of consensus. In order to build consensus, many contentious issues were put to one side. It is particularly noticeable that issues of politics, power and social equity, while mentioned in the group reports,

were not discussed in the overview chapter. Similarly, the most vulnerable and marginalised communities were almost invisible in the report.

There were, however, some underlying themes across all four groups. They all agreed on a need to address the problem of resource constraints in the agri-food system, a need to increase production (regardless of how that production might be re-directed), a need to manage demand, a need to increase investment in agriculture, and the centrality of smallholder farmers to any solution – either to sustainability challenges or to food security concerns, as well as the inadequacy of current governance systems to deliver a change in direction.

2.3.1.4 World Economic Forum (WEF) report

The report assumed that the current shape of the global agri-food system should be maintained, and that problems of resource scarcity and food security could be addressed by making markets function more efficiently. The report also assumed that demand for agricultural products will increase, as will demand for resource-intensive products such as meat, dairy and processed foods. Those demands could be met by increasing production and the greatest opportunity for yield increases will lie in developing countries.

The report assumed that agriculture can be an engine of economic growth and therefore making the agriculture sector function more efficiently will reduce poverty. This will happen not just by increasing production, but by getting products to the market. Economic rewards will accrue to individual entrepreneurial farmers who are able to take advantage of these opportunities, as well as to the share-holders of the global TNCs who control the value chains.

2.3.1.5 G20 Action Plan on Food Price Volatility and Agriculture

The G20's focus was on the functioning of markets, primarily at global level. It presented a narrow, linear framing of the problem of food security. Its analysis was based on the assumption that improving the functioning of markets will increase production and that increasing production and productivity will enhance food security. The key to increasing production will be addressing food price volatility which should encourage investment and improve market functioning. Although improving agricultural productivity was the first of five objectives of the report, the other four relate to tackling food price volatility (G20 2011, p.3).

The logic of the framing is that people go hungry because prices are too high. Therefore strong international markets are inexorably linked to increasing access to food for the poorest. Liberalised markets are essential because the 'unrestricted flow of food and agricultural commodities' (op. cit. p.10) contributes to food security. The report therefore focused on production, productivity and market functioning, rather than issues of distribution, access, affordability, equity or rights.

2.3.1.6 Global Strategic Framework on Food Security and Nutrition (GSF)

The GSF was framed around governance, the functioning of institutions and the embedding of rights within legislation and institutional frameworks. It considered poor governance to be a limiting factor to the realisation of rights and considered governance across multiple sectors to be relevant. It stressed the responsibility of states and multilateral institutions for ensuring international law will be upheld.

It laid out the “Foundations and overarching frameworks” on which it was based (CFS 2012, p.10) in terms of UN charters, resolutions and international agreements. It used the Right to Food as the basis of its position, informing the way the problem was considered and how solutions were identified. It thus made explicit the normative underpinning for its framing, and addressed the problem of hunger from a transparent values-based position.

This gave GSF a coherent internal logic, based on an understanding that the purpose of the food production system, and agricultural investment, should be specifically about reducing hunger, increasing food security and addressing resilience amongst the poorest and most vulnerable populations.

2.3.2 Comparative discussion of the relationship between framing assumptions and policy judgements - Influence of framing assumptions on policy judgements

Those 6 sets of underlying framing assumptions influenced the policy judgements, and led to very different policy recommendations, when comparing across the reports.

For example, GSF assumed that in order to ensure the Right to Food, systems must be created to enforce its realisation, monitor implementation and ensure accountability. The assumption was that change will only happen if institutional frameworks are put in place to enable and enforce the necessary changes. UNDESA took a similar position in relation to environmental resource constraints, assuming that problems could be addressed through improved governance systems.

By contrast, Foresight’s framing assumption that trade is the driver of economic development meant that policy options to place regulatory limits on market functioning were rejected. Thus recommendations for action in high-income countries centred around changing consumers’ behaviour and encouraging voluntary corporate actions rather than legislating. For example, actions on responsible fishing and reducing GHG emissions were framed in terms of consumer pressure shaping the market and creating incentives for change e.g. (Foresight 2011a, p.20). Similarly, WEF and G20 expected markets to solve identified problems, adopting paradoxical approaches in which market failures were acknowledged but not addressed.

CFS, IAASTD, WEF and G20 all applied their underlying framing assumptions in consistent ways. For WEF and G20, their core concern regarding market functioning can be seen in the policy recommendations they provided. But their narrow focus was evident in the numerous factors that they failed to address, which led to inconsistencies and contradictory recommendations. Those contradictions highlight the dissonance between what they said they were about, namely food security, and what their policy recommendations actually addressed, namely the functioning of markets. For example the G20 committed establishing an Agricultural Market Information System (or AMIS) (G20 2011, p.7) which could “...focus on the main market players which account for the greatest part of world food production, consumption and trade.” But that ignored the challenges facing the most food-insecure subsistence farmers who grow crops that are not traded on international markets. That approach fitted with a framing

of food insecurity as caused solely by high prices, but it did not fit the reality for many communities in developing countries. Similarly, (WEF 2012) stated that the goals of its New Vision were: "...to simultaneously advance economic growth, global food security and environmental sustainability through markets-based approaches..." (op cit:3) as if those were entirely consistent objectives.

There were also inconsistencies in the relationships between analyses and recommendations, and between outputs and outcomes. Foresight showed inconsistent approaches to the market, and to the role, value and efficacy of consumer behaviour change programmes. For instance, 'hunger reduction' was specified as the goal of agricultural development (Foresight 2011b, p.25) when addressing "Challenge C: Ending Hunger" (op. cit. p.23), but "Challenge B: Addressing the threat of future volatility in the food system" (op. cit. p.22) put the functioning of free markets as its primary goal. That section might be written very differently if hunger and poverty reduction had been the central objective.

Foresight's framing of the problem, primarily as one of sustainable production, where 'sustainable' did not take account of social or cultural considerations meant that increasing global food supply did not necessarily fit with supporting rural communities or sustaining rural livelihoods. While this might have been consistent with an approach that embraces a model of development framed around providing cheap food for urban populations, it is hard to see how it could be consistent with addressing the current needs of food-insecure rural populations.

WEF's approach focused on areas with high potential ('breadbaskets') rather than areas with greatest need (WEF 2010, p.19) and on crops that could capitalise on market demand and comparative advantages (WEF 2012, p.10). However, that was inconsistent with an approach that chooses crops for agronomic and nutritional value (op cit p 11), suggesting a conflict between policy choices in support of different goals.

2.3.3 Paradigms presented in the reports

The reports presented different models of the current and future functioning of the global food system, with all the reports, except the G20, recognising – at least rhetorically – a need to change the way the system operates at the moment.

WEF called for "...fundamentally shifting the way the system operates..." (WEF 2010, p.5) to focus on increasing smallholder productivity in developing countries. It presented a revised productionist approach, which acknowledged a need to address the environmental consequences of past agricultural practices, but continued to champion a model of increasing yields through the use of technological innovations for specific crops, though increasing production should also address nutritional concerns. That approach contributed to a narrative about change: "...yesterday's approaches ... will not be sufficient tomorrow." (op cit:10) But the report assumed that the current shape of the global agri-food system should be maintained, and that problems of resource scarcity and food security could be addressed through technological developments and better functioning markets.

UNDESA also called for changes to the system, questioning both how food is produced and how it is used. It called for a greater focus on the environmental implications of production methods and on waste and consumption patterns, as well as enhanced understanding of the multiple functions of agriculture.

Foresight stated that the food system was facing “...an unprecedented confluence of pressures...” that “...constitute a major threat...” (Foresight 2011b, p.9) It argued that “Much of the responsibility for these three billion people having suboptimal diets lies within the global food system...” (op. cit. p.10) suggesting a need for a radical changes in the way the food system functions. It called for “...interconnected policy-making...” (op. cit. p.12) and noted the need for action on multiple fronts simultaneously rather than “... making changes piece meal to parts of the food system.” (ibid) Those included changing diets, producing more, improving governance and reducing waste, but did not include addressing equity, distribution or issues concerning access. Like WEF, despite the rhetoric to the contrary, it suggested ways in which the system could function better, rather than changes to the fundamental characteristics of the ways the system operates.

IAASTD recognised that was possible to change the policies and practices that have shaped the prevailing global agri-food system, and that it was not necessary or desirable to continue along the current trajectory. It called for a paradigm shift, from the current production-focused approach to the agricultural sector and from a narrow sectoral approach to one that takes account of the ways in which different sectors, such as energy and health are interlinked with agriculture.

GSF similarly called for a shift in the focus of policy from aiming to increase production to a focus on increasing the ability of smallholder farmers to produce, manage risks, retain their produce and use their produce to reduce their food insecurity.

Those different understandings of desired directions of change arose from differences in understandings of what constitutes a sustainable system and what is to be ‘sustained’. WEF’s concern was to sustain (and increase) global food production leading to solutions aimed at bringing more land under production, increasing productivity and yields in developing countries and expanding commercial agriculture. IAASTD and GSF were concerned with sustaining rural livelihoods and increasing food security and therefore considered taking land from indigenous communities and expanding commercial agriculture to be part of the problem, not the solution. UNDESA’s concern was to maintain environmental resources and ecosystem services, and suggested solutions aimed at valuing those and incentivising their protection. Foresight’s formulation of the idea of ‘sustainable intensification’ suggested a concern to sustain both environmental resources and global food production.

WEF, Foresight and G20 all assumed that ‘development’ implies moving to the western model of consumption and promotes policies to enable agricultural growth to continue along the current trajectory. Meeting anticipated demand was the core concern of WEF and G20, rather than examining possibilities to re-shape demand. Conversely, IAASTD considered problems of

hunger and poverty to be a direct result of the focus on production and profit rather than on sustainability and developmental goals.

Nonetheless, even those reports which adhered to a productionist paradigm reflected a shift in the framing of that paradigm to incorporate a growing understanding that more food is not the same as nutritionally adequate food (Pearce 2012). They also reflected a shift towards recognising the need to better manage natural resources, and a shift in the focus of the productionist approach towards increasing small-holder productivity.

2.3.4 Different approaches of policy documents and assessments

The documents under consideration have here been categorised as either policy documents or assessments of the current and future functioning of the global agri-food system (see 1.2). G20, GSF and WEF have been categorised as policy documents; IAASTD, UNDESA and Foresight as assessments. While there is some overlap between the categories, it is possible to identify some differences between them.

The policy documents generally focussed more on recommendations and actions than on analyses of causes of the problems and challenges confronting food systems. The assessments devoted more effort to analysing how the identified problems have arisen. While all the documents supported country-owned strategies, those strategies were prioritised in the policy documents, highlighting a level of policy cohesion across them. This perhaps reflects the way in which policy makers need to take account of previous decisions and prevailing commitments if they are to build political consensus around new proposals. Although the private sector group behind WEF did not need to adopt that perspective they endeavoured to build credibility for their approach by locating it within dominant internationally agreed frameworks.

The processes of choosing the boundaries of their problems included choosing whose perspectives and views would be considered. If only a few organisations and individuals, representing a narrow section of society, are consulted it is probable that fewer perspectives will be taken into account. IAASTD, UNDESA, WEF, GSF and Foresight were produced after consultation processes but the IAASTD and GSF processes were significantly broader and more transparent than the others. The WEF process, on the other hand, confined its consultations to "...leadership-level brainstorming sessions..." (WEF 2010, p.3), while UNDESA consulted a category described as "...thought leaders..." (Giovannucci et al. 2012, p.viii) By mainly consulting 'leaders', UNDESA and WEF excluded the voices of less powerful groups. While UNDESA acknowledged this as a shortcoming, WEF specifically sought the engagement of "...large commercial players..." (WEF 2010, p.13) The interests of incumbent powers were therefore reinforced through the narratives of the reports, and issues that would challenge that power were disregarded.

A further difference concerns the ways in which the reports presented their evidence and recommendations as either objective 'facts' or normative positions. Again, this depended more on the breadth of consultation and participation than on whether they were policy documents or assessments. IAASTD and GSF both made clear their normative stance, and framed all their policy choices on those bases. For instance, GSF put 'rights' at the centre of its analysis and

considered possible trade-offs in terms of their impacts on rights, leading to policy recommendations that made private sector interests subservient to rights to land for smallholders e.g. (CFS 2012, p.23).

UNDESA also started from explicit normative commitments, but did not use those as a consistent frame for its analysis. Foresight, WEF and G20 were also based on normative positions, but they were not stated explicitly, or even acknowledged. Instead they were presented as if objective ‘facts’. For instance, in its high-level conclusions, Foresight suggested that all policy options should remain open and decisions should be based on evidence. However it then closed off a policy option, without any supporting evidence, by asserting that national self-sufficiency was not an option, at least not for the UK, and countries must participate in globalised trade (Foresight 2011b, p.13).

The assessments generally had broader perspectives than the policy documents, though GSF, as a policy document that emerged from a wide consultative process, did not conform to that pattern. However, both the G20 and WEF bounded their problems rather narrowly, in terms just of the agriculture sector, and therefore were unresponsive to issues falling outside their frame of reference. But it is difficult to disentangle the political processes through which the reports were produced from the ways in which they framed their ‘problems’. This was especially clear in relation to the G20, whose narrow focus on the agricultural sector may be a consequence of having been prepared by ministers of agriculture. While other issues, such as energy, health, environment and finance may be relevant to the ways in which the agri-food system functions, action in those sectors would have had to be agreed by their ministerial colleagues.

3 Appraisal and discussion

In the previous section, the six reports were examined in order to draw out underlying framing assumptions, and to ask how sustainability challenges, dynamic changes and uncertainties were characterised and addressed.

This section aims critically to appraise the documents on the basis of the breadth or narrowness of their framing assumptions and how the 3Ds are addressed. It will provide answers to questions posed in the introduction, using the criteria outlined in section 1.4.

3.1 Directionality

The plethora of policy initiatives, reviews and foresight exercises undertaken in recent years have been responding to increasingly widespread concerns about the ability of the prevailing food system to cope with the challenges facing it now and into the future.

Those challenges have thrown into focus long-standing debates about agricultural policy in developing and developed countries, and have brought to the fore debates about the goals of the food system and the nature of progress. For example, (Stirling 2009) highlighted the need to question the direction of ‘progress’ noting: “There are many possible pathways; each looks preferable under different values or interests.” In stark contrast, the WEF and G20 assumed only one possible pathway, and the singular acknowledged pathway was itself the goal. Any presumption of a singular goal and pathway is problematic both analytically and normatively, and

it is problematic for pragmatic reasons too. As Lang and Barling have argued: “Agriculture is still the world’s main source of employment, but the mainstream approach to economic development still sees a shift of labour from the rural and agriculture to the urban and off-farm as progress.” (Lang & Barling 2012, p.318)

Foresight also understood and portrayed development in a singular fashion, as a move from agrarian societies to urban residents fed on cheap food produced on an industrial scale by a much-diminished rural workforce. Although it recognised that “Development of sustainable production systems that avoid the mistakes made by countries which moved out of the low-income class in earlier times is required...” (Foresight 2011a, p.35) it is unclear whether this was a radical call for a new type of development or a more familiar acknowledgement of some of the negative environmental externalities of industrialised agriculture, similar to WEF’s approach.

While all the reports placed some emphasis on the role of smallholders in agricultural production, WEF, G20 and Foresight considered their role primarily as producers of commodities for the world market, consolidating the development of a trade-based global food regime (Feldman & Biggs 2012a, p.141). UNDESA also considered farmers primarily as (maybe embryonic) entrepreneurs, and the private sector as the provider of solutions. IAASTD’s perspective was radically different, suggesting agri-food systems which would not privilege one function (i.e. production) of the system over others, and which would focus on the needs of farming communities enabling countries to promote pro-poor outcomes.

As Stirling has argued, when ‘progress’ is considered in a single, linear, way it was also often portrayed as inevitable. Attempts to question its direction are rendered futile and “...the scope for human agency and social choice are thus reduced to restricted manoeuvrings under an essentially fixed set of imperatives.” (Stirling 2009, p.4) An approach of that type was evident in Foresight, which assumed that the global economy will continue to develop in the way in which it has recently developed, and that policy makers are unable fundamentally to influence that trend. Conversely, IAASTD and GSF explicitly challenged the direction of ‘progress’. UNDESA asserted, in relation to the prevailing *status quo*, that: “We are aiming at the wrong goal...” (Giovannucci et al. 2012, p.iv) calling for the focus to shift from production to access and nutrition. However, it remained framed within an essentially trade-based approach to delivering such change.

Similarly, UNDESA and Foresight both debated the relative merits of different types of agricultural production and agricultural technologies, suggesting a recognition that there may be different pathways to ‘sustainable development’. IAASTD, however, questioned the purpose of different agricultural technologies, calling for appraisal of alternative options to focus on the costs and benefits for the poorest and most vulnerable communities e.g. (IAASTD 2009b, p.37).

IAASTD, GSF, Foresight and UNDESA acknowledged that there are choices to be made about the goals of the food system, and the desired direction of change. For instance, Foresight called

for the whole food system to be redesigned in order to “...bring sustainability to the fore.” (Foresight 2011a, p.12) (Sustainability is also the core concern of UNDESA, but by comparison, IAASTD called for a redesign to put equity at the centre, and GSF highlighted rights. Foresight and UNDESA also acknowledged choices about goals primarily at the rhetorical level, but their policy recommendations did little to change the direction in which the sector was moving. Neither WEF nor G20 engaged with the issue of directionality at any level; they remained wedded to a ‘productionist paradigm. As Thompson & Scoones have argued, that linear technology-push model of progress has dominated food and agriculture policy for the last 60 years, and has focused on increasing production and productivity as the key to reducing hunger (Thompson & Scoones 2009).

In the 1940s to the mid-1970s the productionist agenda was supported in many countries by state funding and policies (Sumberg et al. 2012), but from the late-1970s, a neo-liberal agenda in many industrialised countries led to the removal, or at any rate reduction, of state support for agriculture and agricultural research. Corporate ownership of, and integration in, the agriculture sector increased, along with the expansion of international trade in agricultural commodities. Global trade liberalisation policies began to shape agricultural policy in developing countries. (Lee 2013, p.216) noted that the idea of food security through trade became increasingly prominent on policy agendas. The dominance of that approach is evident in WEF, G20 and Foresight, none of which considered it open to question.

Nonetheless, civil society actors developed alternative approaches with more explicit foci on socio-economic aspects of access to food. These take into account the four dimensions of food security acknowledged by the 1996 World Food Summit– food availability, access to food, safety (encompassing nutrition and health) and stability (political, economic, climatic) (FAO 2002) – challenging the ‘productionist’ approach’s narrow focus on availability above the other considerations. Alternative approaches include the ‘right to food’ and the ‘food sovereignty’ approaches. Those approaches have the virtue of making explicit key socio-economic, political, cultural and power dimensions of hunger and poverty and they demand a more holistic understanding of agricultural production systems, taking into account social, cultural, economic and environmental aspects of the food system. Those approaches are evident in IAASTD, GSF and some of the ‘world views’ presented by UNDESA, but they are explicitly deemed ‘anti-trade’ by Foresight (Foresight 2011a, p.96).

(Sumberg et al. 2012) further identified an environmental agenda, which has led to the rise of ecology-based approaches to agri-food production. Similarly, Lang & Barling identified the dominance of a discourse asserting that food security can only be addressed through increasing production, but suggest that “...there is now a considerable rupture in this discourse.” (Lang & Barling 2012, p.313) They argued that emerging concerns about environmental, health and social impacts of the way in which the food system functions are disrupting and undermining the productionist paradigm.

Certainly all the documents examined here used discourses of ‘sustainability’, and issues such as nutrition and smallholder livelihoods, which had previously been neglected, were included in their discussions. However, while some authors considered the food price crisis to present evidence of the failure of the way the system operated (e.g. (Lang 2010), (McKeon 2011), Lang & Barling suggested that the food price crises had led to a marginalisation of approaches that took into account food system complexity (Lang & Barling 2012). They argued that a crisis narrative had developed, highlighting a need urgently to increase food production to counteract rising prices, facilitating a re-emergence of productionist narratives.

(Feldman & Biggs 2012b, p.147) similarly suggested that focusing on the neo-Malthusian imperative to produce more food meant that questions of sustainability or equity could or should be put to one side. This could be seen in the G20 and WEF. WEF considered sustainability, hunger and poverty to be technical problems, to be solved managerially. It did that by only considering the environmental aspects of ‘sustainability’ and not human well-being or aspects of social justice. Thus the crisis narrative reinforced a technocratic productionist paradigm and reduced the policy space for debates about alternative approaches that might challenge incumbent power structures (Chandler 2012).

If progress can be portrayed as unidirectional, then the costs and benefits are inevitable consequences of progress; but if multiple pathways were considered then the vulnerability of some groups to the outcomes of particular technological choices could raise issues of social justice and equity (Stirling 2009, p.19).

In section 2 above the values underlying the policy recommendations of the different documents were characterised. Those values informed policy choices and the directions of change for which policies aim. (Garnett 2013, p.2) described the supply-side, market-based approach as one that assumes technological and management solutions to the problem of producing more (and better quality) food with fewer adverse environmental impacts and then identified the values underlying this approach – values that assume that a ‘good life’ consists of western-style affluence and consumerism. The aim is to maintain economic growth, but be more efficient about it so that current levels of consumption can reach more people, while still remaining within anticipated ecological boundaries.

Those normative objectives were evident in WEF and G20, but were challenged in IAASTD and GSF. UNDESA questioned consumption as a goal, asking whether that approach took health into account, but nonetheless champions a market-based approach to delivering food security. Foresight attempted to balance a range of normative objectives. The reports exhibited diverse normative objectives, based on different underlying values. But the debate has not centred on those values, and has failed to reconcile them. As (Garnett 2013) noted, debates have focused instead on different types of technologies or different models of development at a managerial level. IAASTD and GSF both made their underlying values explicit, thus creating the possibility

of debating values and political positions, but the other reports did not, thus inhibiting political debates.

(STEPS 2010) noted that it is not usually possible to pursue a range of policy directions simultaneously and equally because of resource constraints and that “this inevitably involves political choices and trade-offs” (STEPS 2010, p.10). Trade-offs between different potential outcomes of policies were dealt with differently: Foresight was explicit about the need for trade-offs, but presented potentially misleading dichotomies between sustainability outcomes and the needs of the poor, rather than examining policy options that could address both. UNDESA side-stepped the problem by not addressing issues where consensus was not reached. GSF’s status as a living document subject to on-going debate enables a continuing process of negotiation over how different priorities will be traded off, but the impact of decisions on rights has been central to the negotiations. IAASTD made it clear that trade-offs have to be on the basis of the pro-poor outcomes; WEF addressed the need for trade-offs but only superficially, just in terms of environmental impacts of different policy choices; while the G20 focused on balancing market stability with humanitarian programmes.

Nonetheless choices about trade-offs are inevitably values-based and dependent on political processes privileging some interests above others. (Margulis 2013) described two different regimes, the ‘international food security regime’ and the ‘agricultural policy regime’. He argued that the agricultural policy regime focuses on production, consumption and trade while the food security regime focuses on “...the widely accepted principle of international, collective action to eradicate hunger...” (Margulis 2013, p.56) Those regimes are inter-linked but also in tension, because different values and interests inform their policy processes. (Margulis 2013, p.65) noted the resistance of G8 and G20 to incorporating a rights-based approach into multilateral responses to the food price crisis, because that would undermine the trade liberalisation agenda. That consideration was also evident in Foresight’s strong condemnation of food self-sufficiency policies.

A further dichotomy presented in post-crisis papers has been between the food security regime and global food system functioning. (Lang & Barling 2012, p.315) noted that the food price crisis was frequently presented as a problem of under-nutrition, placing it in the context of a food security agenda within a development discourse. This undermined wider discussions about food, health and nutrition (such as those raised by UNDESA) and the functioning of the food system in both developing and developed country contexts. That narrow focus enabled sustainability concerns to be presented as if potentially in conflict with the needs of poor people (as in Foresight) and reinforced the urgency of calls to introduce technologies such as GM, which supposedly would increase productivity. The separation of the discourse around development and food security from the discourse about food system functioning and sustainability narrowed the scope for open debate about both, and about their underlying values.

That separation was most evident in Foresight. For instance, the report recognised that market failures allow the production of negative environmental externalities (Foresight 2011b, p.33) but suggested market-based solutions. In addition, market failures were only recognised in relation to the protection of ecosystems, but not in relation to issues of production, distribution or access. Similarly, despite putting reducing hunger and poverty as a key goal, it stated: “It is essential that mechanisms are put in place to give governments the confidence in the global trade system to resist what will often be intense political pressures to impose export restrictions at times of high food prices.” (op. cit. p.23) That elevated the free functioning of the market to a higher priority than citizens’ access to affordable food, or individual countries’ internal democratic processes.

Similarly, inconsistencies were apparent in G20. The rhetoric of the report highlighted the need to address poverty and food insecurity but the achievement of food security was framed within the functioning of the international trade regime. By this reckoning, well-functioning markets are essential to encourage investment; investment is essential to increased production, and production increases are essential to addressing food insecurity. The ‘unrestricted flow of food and agricultural commodities’ is assumed to contribute to food security, consequently concerns about poverty, distribution or access are irrelevant (G20 2011, p.9). Yet the report also reasserted the ‘right to food’ “...in the context of national food security.” (op. cit. p.1) The tension between those assertions was not acknowledged in the text.

While the rhetoric in all the reports was about addressing the needs of the poorest, policy choices failed to engage with key factors affecting poverty and hunger. For instance, G20’s rhetoric in support of country-led programmes was contradicted by policies supporting trade-based approaches to food security. Similarly, in Foresight, consecutive paragraphs directly contradicted each other, and the conflict between trade commitments and commitments to local populations was actually spelt out. The gap between rhetoric and reality is considerable when values are not made explicit.

3.1.1 Global governance

Following the ≥ 2008 food price crises, multiple processes and initiatives focusing on the global agri-food system were established. Golay and Buschi (2012:18) noted a ‘growing consensus’ that global governance mechanisms needed to be improved and, as understanding of the interlinked nature of factors affecting food insecurity increased, there were also growing calls for improved global policy coherence across different sectors (Duncan 2013).

But the purpose of such ‘policy coherence’ as might be achieved remained ambiguous: was it to protect markets, to improve food security or to address some other global or local concern(s)? Foresight called for “...interconnected policy-making...” (Foresight 2011b, p.12) and action on multiple fronts, including changing diets, producing more and reducing waste, but did not address issues concerning equity, distribution or access. If there is a need for policy coherence, what should the central policy be? (Duncan 2013) Should all policies be coherent with the G20’s positions, or with GSF’s? This raises questions of leadership and power within global governance frameworks.

The concept of 'global governance' has emerged as the need to address global problems has been increasingly acknowledged (Duncan & Barling 2012, p.145). As Lang has argued, as new pressures, and new combinations of pressures, affecting food systems have emerged new policy processes are needed to address them (Lang 2010). But the idea of governing the food system at a global level is still in development, and how it might be done, and by whom is contested. (Feldman & Biggs 2012a, p.139) suggest that the existence of global assessments and their reports is an indication of a shift from considering the world as developed and under-developed, to considering all countries to be part of one global 'arena': "Global assessments are research and policy exercises that recast how to think about national planning given that individual nations or states are now envisioned to be part of a large public arena where borders and national boundaries no longer mark the singular space of responsibility."

Feldman & Biggs have suggested that global frameworks are being developed within which national strategies are located. On the other hand the 6 reports examined here stressed the need for global institutions and mechanisms to support country-led strategies and they only addressed the functioning of the global agri-food system to a rather limited extent. Food systems in developing countries are discussed primarily in terms of food security, aid and development programmes, whereas the food systems of industrialised countries are framed in terms of unimpeded flows along value chains and their impacts on public health. While individual nation states may no longer be considered to set the boundaries of the problem(s), they are nonetheless discussed as if setting the boundaries of the solutions. Some international assessments, of a type not reviewed in detail here, such as those addressing climate change, may reasonably be characterised as genuinely 'global', but hunger is still conceptualised as if confined within national borders and responsive to national policy decisions. Although the ≥ 2008 food price crises were seen as global, and policy responses focused mainly on global aggregate quantities of food produced, lines of policy responsibility and accountability as between local, national, regional and global levels remain unclear.

Foresight and G20 both stressed the primacy of global trade to ensuring national food security. Foresight acknowledged the potential risks for a country of placing their "...trust in the international system..." (Foresight 2011a, p.19) but suggested that giving more powers to international institutions would not mean relinquishing national sovereignty. However, (Duncan 2013) argued that global frameworks stress the need to support country-owned initiatives, which shifts responsibility for policy implementation from the global to the national level. But at the same time, country-owned initiatives are supposed to conform to global governance frameworks centred on trade, which make it easier for Trans-National Corporations to invest in national programmes; the framing of the New Alliance is all about encouraging private sector investment in African countries (Duncan 2013).

(Margulis 2013, p.57) highlighted conflicting interests across different regimes – trade, human rights and food security – which interact with agricultural policy. The inclusion of agriculture into WTO negotiations, and the resulting treaties, prioritised trade over other interests and set

limitations on the policies and actions that nation states may lawfully implement to ensure their domestic food security. It also created a complex of institutions with overlapping mandates. While there may be a consensus about the need to reform the global governance of food security, there is an on-going struggle between different *fora* to become the central location for global governance and policy coherence. Foresight, G20 and WEF placed the market at the centre of their policies to address food security, and prioritised adherence to WTO rules, but IAASTD and GSF highlighted and prioritised UN institutions and frameworks over the WTO. (Wise & Murphy 2012, p.25) reported a jockeying for position between G8 and G20 on the one hand and UN institutions such as FAO and CFS on the other.

Other players, such as G8 and the World Bank (WB) also influenced the development of governance structures and lent authority (or not) to competing initiatives. Feldman and Biggs described attempts by several private sector corporations to de-stabilise the IAASTD process, through its privileged relationship with the WB and highlighted the ways in which in-house WB publications, aimed at guiding Bank policy, failed to engage with IAASTD and therefore contributed to an atmosphere that undermined the IAASTD's legitimacy (Feldman & Biggs 2012b, p.158).

One of the ways in which initiatives can gain authority is if other processes and products refer to, and build on, them. For instance, the GSF referred to a range of UN frameworks and conventions, as well as to policy initiatives by G20 and other bodies, locating all those processes into a common framework. Similarly, G20 referred to the work of the CFS as well as IAASTD. WEF, however, stood outside this policy arena, as a private sector initiative operating in a limited number of countries. It engaged only minimally with governance issues and self-selected 'stakeholders' it deemed 'relevant'.

However, all the processes were politically constrained in various ways. Although GSF was the product of a wide participatory process, it was nonetheless constrained by UN protocols and procedures. The G20 Action Plan, produced by Agriculture Ministers, only had a remit to deal with very specific agriculture-related issues, and had to refer wider policy issues, which affect food security, to other authorities thus diminishing policy coherence across sectors.

There were also political constraints on the institutions generating these assessments and policy proposals. Although TNCs dominate the global food market (Wise & Murphy 2012) and G20, WEF, Foresight and (to an extent) UNDESA championed the role of the private sector as best placed to deliver food security; they barely acknowledged the global commercial power of TNCs or their influence on public policy-making. For instance, Foresight did not consider the small number of companies dominating the global food chain to be problematic (Foresight 2011b, p.21) and assumed "...healthy competition at local levels..." is viable even with high levels of concentration at global, regional and national levels. How trade-offs between private and public goods, and national and global interests were to be judged, and where responsibility for making

decisions about such trade-offs remained opaque. While there seemed to be tacit understandings that power has shifted, and is shifting, from nation states to international institutions and commercial organisations, was only explicitly addressed by the IAASTD.

The reports and assessments took contrasting approaches to monitoring the impact of their recommendations or proposed actions, and to the case for establishing lines of accountability. WEF set targets to increase production by 20%, and to reduce both poverty and emissions from agriculture by 20% per decade (WEF 2010, p.4), but did not specify whether these are aggregate global targets or national programme level targets, and failed to outline any process for measuring results or reporting to stakeholders.

The G20 sets out four concrete actions with implementation plans, along with multiple recommendations for actions by others. It asserted a commitment to regularly reporting on progress implementing its Action Plan (G20 2011, p.14) but did not define 'regularly' and did not specify any targets or means of measuring the impact of resultant actions. Although the G20 is, in theory, democratically accountable to the citizens of member countries, 'citizens' were conspicuous by their absence from its analysis.

Foresight suggested a set of 'Priorities for Action' (Foresight 2011b, p.34) all of which were generic and devoid of targets or timelines. IAASTD's recommendations were more about the direction of change than about specific actions in those directions. UNDESA included improving measurement and understanding of the impacts of policies as one of its nine consensus recommendations (Giovannucci et al. 2012, p.63). GSF threaded a concern with monitoring and evaluation through all its recommendations, and focused on creating legislative frameworks to ensure the upholding of rights. It noted:

“Accountability for commitments and for results is crucial, especially for advancing the progressive realization of the right to adequate food, and it is noted that those countries making the greatest progress on food security and nutrition are those that have demonstrated the greatest political will, with a strong political and financial commitment that is open and transparent to all stakeholders.” (CFS 2012, p.34)

GFS laid out where (national, regional, international level) responsibility should lie for monitoring, accountability and transparency. It also noted its mandate to promote and enhance accountability (op. cit. p. 34) and discussed the development of mechanisms to ensure monitoring and accountability within countries, and in relation to monitoring the implementation of its own recommendations. The different approaches raise questions about the ability of those processes to influence change within and between competing governance structures.

This examination of directionality and global governance has revealed that numerous stakeholders in the global agri-food system are continuing to struggle over issues concerning governance systems, priorities and which policy regime would dominate and shape the direction

of system change. Inevitably politics and power affect the establishment of international coordination structures, and overlapping interests can increase both duplication and uncertainty (Margulis 2013). But the establishment of the CFS with the aim of becoming "...the most inclusive international and intergovernmental platform for all stakeholders to work together to ensure food security and nutrition for all..." (FAO n.d.) with a clear mandate to coordinate global actions on food security has enabled a rights-based approach to move up the policy agenda, even though its pivotal role is contested.

3.2 Distribution

The mainstream 'productionist' approach assumes that increasing agricultural production will reduce hunger. But over decades a body of evidence has emerged contradicting this assumption (e.g. (Sen 1983); (FAO 1997); (Meeker & Haddad 2013)). Given that for decades, millions of people have suffered chronic hunger even though more than enough food is produced annually to feed everyone, if the food was more equitably distributed, questions are raised about the distributional impacts of innovative technologies and policy choices. They may be disproportionately negative for poor people or just neglect the needs and interests of the poorest and most vulnerable. But those outcomes are not inevitable; different choices about policies and directions of change can lead to different distributional effects (Stirling 2009). Despite rhetorical claims of putting food security at the centre of policy making, policy choices in practice "... often leave as consequential, rather than constitutive, the need to address poverty and ecological sustainability." (Feldman & Biggs 2012b, p.149) As Stirling noted: "Conventional distributional measures aim at reducing inequities in implementing paths privileging the powerful, rather than pathways enabling the poor." (Stirling 2009, p.unnumbered) Addressing poverty and food insecurity often remain an add-on to such central concerns as maintaining production levels and unrestricted global trade. The aim of some of the exercises was not to eradicate poverty but to keep it within 'acceptable' levels. For instance, Foresight's asserted that 'hunger reduction' should be the goal of agricultural development (Foresight 2011b, p.25), but fails to indicate by how much it should be reduced? It remains unclear what level of hunger might be acceptable?

In relation to food price volatility, Foresight asked what level of volatility was acceptable (op. cit. p.23) and recognised that it is a political judgement. It also recognised that market-based approaches do not reach everyone, and that some communities and households need to be supported through social safety net programmes. (ibid) Similarly, WEF suggested that the social consequences of a market approach can be addressed through the actions of governments and CSOs (WEF 2010, p.22). WEF took the view that poor people should be empowered to participate in markets, rather than given aid (op. cit. p.8) and considered social issues to be the responsibility of governments, not an output of an effective food system. Both reports prioritised policies to address market functioning, with little concern for their social consequences. Conversely IAASTD considered those consequences as core problems to be addressed when reshaping the food system. In its recommendations for action, UNDESA was strangely silent on this issue.

(STEPS 2010, p.11) called for policy pathways that can address "... the highly differentiated nature of needs and experiences in the real world..." However, the G20's Action Plan focused on research into wheat, market information for globally traded agricultural commodities (initially with the involvement of G20 countries only), and a monitoring system to improve forecasting of agricultural production. Those initiatives all operate at the national, regional or global levels, but fail to take account of diverse contexts. The G20 assumed that everyone can participate in the market at some level, and ignored the needs of marginal groups such as landless labourers and smallholder farmers in remote rural areas. Policies aimed at improving market functioning only helps those farmers who are producing enough, and sufficiently well-connected, to participate in markets, but that does not include those who are most food insecure.

Conversely, the GSF focused, not on increasing production, but on increasing the ability of smallholder farmers to produce, manage risk, retain their produce and use their produce to reduce food insecurity. It stressed the idea of "...smallholder-sensitive investment in agriculture..." (CFS 2012, p.14) which led it to focus on governance issues, as well on access to productive resources such as land, and on social outcomes, rather than agricultural outputs. By examining policy choices through a 'right to food' lens, it shifted the approach to social protection from one of charity to one of legal responsibility, including redress when it is not provided (Schutter 2013).

The 'right to food' approach also "...creates new expectations among citizens and other actors for state action to promote food security..." (Margulis 2013, p.59) and "... requires that States adopt national strategies to progressively realize the components of the right to food that cannot be immediately guaranteed." (Schutter 2013, p.5) This shifted the idea of eradicating hunger from the realm of rhetoric to an achievable, if long-term, goal. This was the aim of GSF's policy recommendations, rather than aiming to reduce, control or manage levels of hunger globally. IAASTD also focused on the impacts and outcomes of policy choices and assessed different policy options on the basis of how they would affect marginalised and vulnerable communities.

(Stirling 2009, p.8) considered distributional impacts across time as well as across geography; a focus on meeting present needs underpins debates about inequality. This can be seen in the approach taken by IAASTD which highlighted the need to address the functioning of the food system. Foresight's focus was on the functioning of the food system in 2050, but it also noted that "...policy-makers should not lose sight of major failings in the food system that exist today." (op. cit. p. 9.) But this was a secondary consideration because "...the food system is working for the majority of people." (Foresight 2011b, p.36) Current distributional and equity issues were not a high priority for Foresight. GSF championed a 'twin-track' approach, aiming to address both short- and long-term hunger simultaneously (CFS 2012, p.10). It also considered the needs of countries in protracted crises, where normal institutional and policy mechanisms cannot apply (op. cit. p. 24), and suggested a range of context-specific responses which extend beyond short-term crisis responses. By contrast, G20 separated policies to address humanitarian

disasters from longer term approaches to food security (G20 2011, p 4). However, none of the other reports engaged with issues around emergencies or food aid at all.

All the reports were concerned with the resource limitations, within which the food system must operate, and they suggested different policy options for addressing 'sustainability' concerns. WEF and Foresight suggested market responses, such as pricing environmental services (WEF 2010, p.22), (Foresight 2011b, p.30) but did not provide concrete policy proposals for achieving this. All the reports recognised uncertainties around the future impacts of climate change. Foresight highlighted the difficulties of designing policy for a future for which the costs and benefits cannot be easily evaluated. However, in discussing the impacts of climate change on the food system, distributional impacts were not addressed. Instead the report took a global-level system-wide approach to issues such as the impacts of extreme weather events on food production. (op. cit. p.29) Distribution of the costs and benefits of different policy options were not discussed.

(Stirling 2009) noted that the diversity of understandings of progress raises the notion of intentionality in choices. When the costs and benefits of particular policies or technologies are being considered, issues of distribution and equity arise. How the distribution of costs and benefits is managed is a political choice. For instance, Foresight was explicit about the need for political judgement to balance the costs and benefits of different possible policies to address food price volatility (Foresight 2011b, p.23) and described the options in social and economic terms. However, the costs of volatility are social while the costs of interventions are financial.

Where they discussed trade-offs, Foresight, WEF and G20 did not provide any detail on how decisions about trade-offs would be reached, or how power between different stakeholders would or should be negotiated. Without the clear focus of IAASTD or GSF on poverty and sustainability goals, it was difficult to see the basis on which decisions about the relative value of different options could be made. This was highlighted by the seven areas of disagreement left unresolved in the UNDESA process.

Distributional impacts are closely related to issues of power. (Lang & Barling 2012) have suggested that few policy documents acknowledge that people are often hungry because they lack both purchasing power and also access to, and control over, productive resources. WEF and G20 both failed to address issues of equity, power along the value chain, control of resources and trade-offs between different political outcomes from policy choices. Foresight and UNDESA both acknowledged the problem but offered no policy solutions. GSF and IAASTD both put issues of power and equity at the centre of their analysis. IAASTD and GSF therefore considered a wide range of institutional factors to be relevant to the functioning of the food system including land tenure, resource access and legal frameworks. GSF based its analysis on the understanding that it is not possible to implement the right to food without first implementing existing international laws and conventions such as those on gender and labour rights, and rights of access to productive resources. Governance of fisheries, forests, water, seeds and land therefore becomes central to the process of ensuring the provision of food security.

Policies need to consider the relationship between inputs, outputs and outcomes. Policies which do not consider equitable distribution of inputs, and ignore power relations, are unlikely to have an impact on the distribution of the outputs of productive activity. This was a profoundly different approach to food security from the one outlined by WEF, G20, Foresight or UNDESA. Although Foresight's concept of 'sustainable intensification' took into account the relationship between inputs and outputs to the food system, and UNDESA considered the relationship between inputs, consumption and outcomes, they both focussed on environmental concerns, but not equity. The problem of food security was still seen in terms of balancing supply and demand, rather than wider issues such as those highlighted by De Schutter when he said:

“...hunger is not simply a problem of supply and demand, but primarily a problem of lack of access to productive resources such as land and water for small-scale food producers: limited economic opportunities for the poor, including through employment in the formal sector; a failure to guarantee living wages to all those who rely on waged employment to buy their food; and gaps in social protection”.
(Schutter 2013, p.18)

3.3 Diversity

This section examines whether and if so, how, the reports acknowledged diversity of stakeholders, agendas and interests, and to what extent they engaged with them.

STEPS has highlighted the importance of establishing processes and “... institutional architectures ... to enable diverse interests and new voices, including those of poorer and marginalised people, to be involved in inclusive debate.” (STEPS 2010, p.19) This can be seen in the differences in the ways in which the reports were produced, and by comparing the range of voices included, as well as how they were included and the analytical outcomes. For instance, although Foresight acknowledged uncertainties in knowledge and incomplete evidence, the process was led by the UK government, which chose which experts to consult, and which papers, on what topics, to commission as evidence to feed into the report, thus delineating boundaries of its deliberations. Nonetheless, it highlighted the role of 'consumers' suggesting that they are a political force, capable of influencing political choices. It identified 'consumers' as a different group from 'citizens' or 'civil society' (Foresight 2011b, p.16). The G20 did not consider issues of representation at all, while representation of different perspectives was integral to the IAASTD process. UNDESA, despite narrow consultation, attempted to incorporate diverse perspectives by recognising the existence of contrasting world views based on different values. However, it was unclear how positions were chosen for inclusion in the report. For instance p.34 described the opinion of one respondent. The relative adequacy and authority of the positions put forward by reports arising from narrow consultation processes was therefore problematic. The CFS was re-formed specifically to be an inclusive process, giving a wide range of voices and perspectives a place at the policy-making table, and the GSF made clear the role and purpose of the process, its positioning with the global context and how different actors might interact with each other (CFS 2012, pp.5–6).

The process of choosing who should be involved in defining the agenda and conducting the analysis was inevitably political, even if the politics were not explicitly acknowledged in the final documents. WEF's choice to consult business leaders and UNDESA's engagement with 'thought leaders' side-lined the voices of farmers working at the beginning of the value chain. The G20 did not make explicit any political considerations but issues of politics and power were evident throughout the document as the G20 ministers used terms such as 'welcome', 'encourage', 'insist' to describe their expectations of work to be undertaken by other bodies, and where they understood responsibility to lie for action on the issues they were raising. The politics of reaching agreement in international *fora* were also implied, but not visible, in GSF through reference to a range of international agreements, guidelines and conventions that had already been negotiated. Similarly, political negotiation was visible in Foresight through the inconsistencies and conflicting policy prescriptions contained in the final report.

IAASTD and GSF both attempted to broaden the range and methods of participation, and aimed to open up relationships between policy makers and intended beneficiaries. The reports that engaged the widest range of participants provided the broadest and least technocratic analyses. However, both the IAASTD and GSF processes have been criticised. Scoones noted, however, that IAASTD was a departure from previous models of decision-making because it aimed to engage civil society in a global process (Scoones 2009). Attempts to build global knowledge were structured into the process, through representation on committees, and the production of regional reports. However, there was disagreement among participants about what constituted relevant knowledge that should be taken into account. Even in this forum, 'expert' knowledge was privileged, and shaped the debate and the final focus on scientific deliberation meant that only elite participation was practical.

Similarly, a desire to engage multiple stakeholders with diverse perspectives and values contrasts with the call to use evidence and build on 'objective' science. Scoones argued that "The IAASTD reports... present the bringing together of diverse knowledges as largely unproblematic." (Scoones 2009, p.564) This challenge was not addressed through the formal structures of the report writing, but in practice the participants discussed issues around whose knowledge counted and what constituted expertise in informal sessions and working groups. Even if it was not entirely successful, the IAASTD process can be seen to have set the agenda for future processes to take into account wider perspectives and enable wider participation than any of the other processes here under review.

The CFS process had been specifically designed to enable participation by a wide range of civil society groups. Civil Society Organisations (CSOs) self-organise under the auspices of the Civil Society Mechanism (CSM), which is autonomous and independent of the CFS. CSM coordination enabled different groups to participate in the debates, negotiations and policy making within the CFS on the basis of one-nation one-vote. CSOs and others were not able to vote, which according to Duncan and Barling increased the legitimacy of the body in the eyes of

some stakeholders because it could not be considered to have been hijacked by interest groups (Duncan & Barling 2012).

Although the CSM faced internal challenges, for instance over the difference between participation and representation and how this was managed amongst diverse stakeholders, it enabled CSOs to engage with each other and with CFS in a new role, and at a level of participation that had not been on offer before. The GSF was also substantially different from the other documents discussed here because it is an evolving document, which is able to respond to changes in the policy environment and respond to new evidence. It was also a demonstration of the ability of CFS to collect more evidence in order to inform decisions about issues that have not yet been agreed.

The GSF's status as an evolving document enables it to deal with disagreement differently from the other processes. (Stirling 2001) described the contrast between a process that highlights differences and one that tries to create consensus. When consensus is the aim, differences between underlying framing assumptions are downplayed. (Scoones 2008) suggested that a process aiming at consensus can close down debate; and that the need to develop scientific consensus around 'objective' evidence can reduce opportunities for open debate about different values and political perspectives. This was most visible in UNDESA, which specifically sought points of agreement and therefore put to one side politically contentious issues. Although it was explicit about doing so, nonetheless the result was a report that ignored issues of power along value chains, within or between countries. Consensus was presented in different ways in the documents, reflecting different governance processes. G20's narrow framing of the problem enabled agreement to be reached over a limited number of actions; WEF did not acknowledge the possibility of disagreement with its perspective.

The IAASTD aimed to present a "...global consensus.." (Scoones 2008, p.42) but was undermined by three countries (Australia, Canada, USA) refusing to agree the final document. Scoones critiqued IAASTD's failure to make explicit the politics of knowledge-making, but by making explicit the values on which its framing was based, it presented a position on many issues that did not serve the interests of some of the most powerful stakeholders participating in the process. Debates about politics and different forms of evidence, even if they took place informally, outside the official 'consensus building' process can be seen reflected in the final text.

Foresight highlighted the lack of consensus on many issues, the range of different approaches to addressing key concerns, and the political debate required about their relative value (e.g. (Foresight 2011b, p.11), on new technologies). It also noted the need to build "...societal consensus..." to address contentious issues such as changing consumption patterns. (op. cit. p.36) It acknowledged the possibility of disagreement across a range of issues, but took others as given, such as the positive value of global trade. The GSF made different perspectives explicit by highlighting a number of issues where consensus had not been reached (CFS 2012, p.36) and

noted the political and economic nature of different positions on these issues (op. cit. p.31). By acknowledging the lack of consensus it enabled diverse perspectives to be brought to the debate.

These six documents also contributed to the process of building a consensus within global policy making, and interacted with each other in that process. At this level, partial consensus was created by building on (or challenging) existing policy, shaping the debate and building understandings that become 'common knowledge'. This can be seen perhaps in the ostensible agreement across all the reports of the centrality of smallholders to the provision of food security, and in the inclusion of nutrition as a key element of food security, neither of which were 'givens' a decade ago.

However, the documents presented different visions of how nutrition security could be achieved and the role of smallholders in that. These were presented as the only possible future by those documents with a narrow framing, but others aimed to create a policy environment that enables multiple approaches to the problem(s). Stirling defined 'diversity' as taking into account the range of contexts, values, and interest affected by policy choices. "By upholding this general value of diversity as a means to accommodate political plurality, there arises the further particular opportunity for the poorest and most marginal groups to ensure that pathways reflecting their own authentic interests and values are included in the diverse mix. The fixation on unitary 'optimal' trajectories does not so readily allow this." (Stirling 2009, p.25) STEPS has stressed the importance of policy enabling diverse choices: "... designing policies that deliberately enhance diversity provides a crucial means to foster resilience – hedging against our uncertainty and ignorance about the future." (STEPS 2010, p.14)

WEF's singular policy prescription, based on integrating smallholders into the global market, reduced the range of options open to poor farmers to address livelihood security, and therefore was likely to have detrimental impacts on poverty and hunger, at least in the short term and at least for those unable to participate in the market process WEF was promoting. Similarly, Foresight's refusal to consider any other way of providing food security at the national level than through interactions with the global commodity trading system reduced the diversity of options open to a country in times of crisis and therefore reduces its resilience to shocks on the world market. Stirling had noted the homogenising effects of globalisation. (Stirling 2009, p.27) The process of participation in the global food market requires standardisation of technologies, products, processes and markets, reducing diversity and limiting alternative structures which support livelihoods.

Feldman and Biggs suggested that a narrow understanding of what rural livelihoods consist of and the relationships between rural and urban livelihoods and production systems leads to conflicts between policies to increase production and those to increase incomes (Feldman & Biggs 2012a, p.109). Approaches that take a narrow view of what constitutes the agriculture sector are not able to take into account the multiple functions of agriculture and ignore the complexity and diversity of agricultural production systems. They also argue that: "The models

they deploy... generally examine agricultural production in isolation from the social, ecological and political relations that structure the agricultural sector.” (op. cit. p. 166)

GSF took a wide understanding of the factors affecting food security, the actors involved in agricultural production and the relationship between natural resources and livelihood security (CFS 2012, p.8). Instead of portraying environmental sustainability and food security as in conflict, it recognised that a wide range of natural resources (such as fisheries and forests) can contribute to agricultural productivity and livelihood strategies.

A singular approach to possible futures also sets up conflicts between alternative visions, rather than allowing for the possibility that they can co-exist. This can be seen in Foresight, which asserted that food-sovereignty approaches are in direct contradiction to market-based approaches to food security (Foresight 2011b, p.19). Conversely, it suggested that multiple different forms of knowledge and technology can be used simultaneously to increase productivity in different contexts. (op. cit. p.34) UNDESA specifically presented several world-views, but did not address the conflicts arising from the different perspectives they present. The G20 barely acknowledged the different contexts within which policy recommendations would be implemented, beyond noting the need for measures that support “...the specific situation of developing countries”. (G20 2011, p.2) It approached addressing under-nutrition solely through research into crop improvements (op. cit. p.15), ignoring the complex array of factors affecting the attainment of a nutritionally adequate diet.

(Scoones 2009) suggested that IAASTD’s focus on values and outcomes enabled different forms of technology to be assessed against their potential contribution to the stated goals, enabling debate to move beyond notions of ‘good’ or ‘bad’ technologies, instead looking at the contexts within which technologies will be used and evaluating not just their environmental consequences but also the socio-economic aims affected by choosing one technology over another. Although some of the documents presented unitary pathways, between them they present a diversity of approaches. This suggests continued plurality within debates about the functioning of the global agri-food system. In particular, the difference between G20 approaches and GSF approaches demonstrates a plurality at the centre of global governance structures. The ongoing nature of the GSF process, as opposed to the fixed character of positions taken by the other, one-off, processes, suggest that there remains room for continued debate including voices and perspectives excluded from other processes.

As discussed in sections 2.2.4 and 2.3.3, there was a gap in some of the reports between the rhetoric of moving away from ‘business as usual’ and the reality of the policy proposals they advanced. Terms such as ‘sustainability’, ‘multi-functionality’ and ‘stakeholder’ carries a variety of meanings across the reports and the reports used terminology in different ways to support their positions. For instance, G20’s core concern regarding market functioning can be seen in the language it used. The first objective of the Action Plan was to “...improve agricultural

production and productivity both in the short and long term in order to respond to a growing demand for agricultural commodities...” (G20 2011, p.3) rather than in order to address current levels of hunger and malnutrition. WEF prioritised multi-stakeholder collaboration (e.g. (WEF 2010, p.12) but the stakeholders were business, government and donors.

The vocabulary of ‘sustainability’ and ‘stakeholders’ was nonetheless used in all the reports. Feldman and Biggs suggested that “... institutions, including the FAO, the World Food Program and the World Bank, have...often appropriated the language of the IAASTD into how they frame the issues that they address.” (Feldman & Biggs 2012b, p.156) This appropriation of language could indicate a general acceptance of the importance of the issues raised by IAASTD, demonstrating that it gained traction despite attempts to marginalise it. Alternatively, appropriation of the language may be a means of devaluing and de-politicising the concepts. For instance, if smallholders are at the centre of all policy processes, then IAASTD’s position appears less radical, and the differences between different policy approaches towards smallholders becomes blurred. Similarly, a general acceptance that food security must address quality (nutrition) as well as quantity leads to technology-driven responses to improving nutrition such as bio-fortification of staple crops. Thus the power of dissenting discourses is reduced.

Stirling has argued that the use of language in non-specific ways is often used to “...‘manufacture consent...” (Stirling 2009, p.9, c.f. Chomsky 2002) Language can also be used to conceal the possibility of broader definitions. For instance, G20 used the word ‘agriculture’ without any qualification, and did not differentiate between agricultural production for food or fuel, thus hiding from view the multiple potential functions of ‘agriculture’. By contrast, GSF used precise language to enable agreement over contentious issues. For example, the call for a conclusion to the Doha Round of WTO negotiations was surrounded by caveats: ‘accountable’, ‘rules-based’, ‘taking into account food security and nutrition concerns’ (CFS 2012, p.16). Support for the Doha Round was clearly circumscribed.

4 Conclusions

This report has analysed and appraised three assessments of agricultural technologies and three food and agricultural policy documents. Using textual analysis, several of the key framing assumptions underlying those documents have been identified, as have areas of their convergence and divergence. The mapping of those framing assumption has served to explain, in large part, their characteristics, similarities and differences. The reports have also been appraised by reference to the normative benchmarks of the STEPS pathways approach, primarily in the form of the 3Ds. The analysis has shown how underlying values and framing assumptions influenced judgements about system trajectories, policy options and technological choices, even though those assumptions often remained implicit.

The documents ostensibly presented a common concern with the problematic character of the global agri-food system and the challenge of achieving food security, poverty reduction and environmental sustainability, but how those considerations were understood and interpreted

varied significantly across the documents; and their perspectives were dependant on their diverse underlying framing assumptions. A superficial reading might suggest that the documents all addressed the same sets of issues, but their processes and outcomes were significantly different, because of their differing political and normative perspectives. Our analysis of their underlying framing assumptions revealed that the main focus of the policy proposals of some of the reports was not simply reducing or eradicating hunger and poverty. Several documents focussed on the operation of markets or on increasing production, while making over-simplified assumptions that chronic hunger can be reduced or eradicated through market liberalisation and increases in aggregate levels of production.

The evaluation of the framing assumptions, against the normative criteria that are constitutive of the STEPS approach, showed that narrow technocratic framings of the problem of chronic hunger in developing countries, as if a technological problem concerned with aggregate production of food, was often coupled to a top-down productionist narrative that provides over-simplified and inadequate diagnoses and prescriptions. Moreover, we have argued that technocratic narratives have been used to close-down or conceal debates about politically contentious issues such as power, control, access and distribution. Of the 6 documents reviewed here, a narrow technocratic approach was most conspicuous in the WEF report, which was produced by a self-selected group dominated by senior executives of powerful agri-business corporations. They could be said to have endeavoured to exercise power by concealing the nature, extent and exercise of their power; by portraying the problem of chronic under-nutrition in developing countries as if a technical problem of production, which could be solved by the farmers adopting the technologies in which the corporations have invested. The contrast with the IAASTD was stark, because it stood out as the report in which normative framing assumptions were most explicitly articulated and in which political and economic power were explicitly addressed.

The foregoing discussion therefore implies that normative and epistemological legitimacy for contributions to debates about the future development of the global food and agricultural system cannot be achieved without explicit acknowledgements of key framing assumptions. Furthermore, while making those assumptions explicit is a necessary condition for providing a constructive contribution to the debates, it cannot be sufficient. The assumptions need not just to be explicit they also need to be appropriate and sufficiently comprehensive. A re-articulated version of productionism, in which key framing technocratic assumptions were explicit, would fail the tests of appropriateness, sufficiency and comprehensiveness. As the International Food Policy Research Institute (IFPRI) has argued: "...focus on technological innovation often leaves as consequential, rather than constitutive, the need to address poverty and ecological sustainability." (IFPRI 2010, p 149)

Given that our world is characterised, and has long been characterised, by chronic under-nutrition for hundreds of millions of poor people, even though an aggregate sufficiency (and often a surplus) of foods has been produced year-after-year, the problem of chronic hunger has

to be understood as one that is at least as much a socio-economic and political problem as it is a technological problem. Consequently reports such as those produced by the WEF have little to offer, as their framing assumptions and resultant substance together fail the tests of adequacy and sufficiency. Reports grounded in broader sets of framing assumptions that acknowledge a multiplicity and diversity of interests and perspectives, as well as the reality and importance of power and powerlessness, are better suited to analysing and explaining the persistence of under-nutrition and poverty, and to suggesting appropriate policy responses to the multiple challenges facing the food and agricultural systems in all parts of the world.

In the reports in which the goals of policy were explicitly articulated, and where they were based on unambiguously normative positions, policy recommendations were more coherent and responsive to the needs of diverse contexts and perspectives. Both IAASTD and GSF explicitly clarified the values on which their analysis was based, and their diagnoses and prescriptions engaged with socio-economic considerations including directionality, diversity and distribution. It is also significant that both IAASTD and GSF emerged from processes that prioritised broadening participation beyond the incumbent authorities and powerful institutions; they endeavoured actively to include in policy deliberations a wider range of perspectives, including representatives of their intended beneficiaries, especially of poor and marginalised groups in developing countries, than had conventionally been the case. As Duncan and Barling have argued, the re-vitalisation of the GSF has tried to facilitate increased participation by those most affected by food insecurity who have previously been “... at the margins of official food security debates.” (Duncan & Barling 2012, p.144)

Their attempts by IAASTD and GSF to widen participation by representative of weak and deprived communities were in direct contrast to processes such as those of WEF and the G20, both of which excluded and ignored all representatives of civil societies in rich, poor and intermediate countries. The more inclusive processes resulted in analyses and prescriptions that put poor people at the centre of policy judgements. As Stirling argued, “...the imperative for systematic inclusion of divergent perspectives from the outset...is not a manifestation of ‘political correctness’. It is certainly a legitimate feature of a democratic political culture. But it is also a simple matter of analytical rigour.” (Stirling 1998)

Some of the main conclusions of this review may be extrapolated from assessments of agricultural science and technology to broader debates about how collective global knowledge-making for sustainability should be pursued if it is to achieve normative and epistemic legitimacy and policy traction. With the possible exception of the IPCC, global assessments have, to date, had relatively little traction in (re)-shaping pathways of change – in their respective sectors, or towards sustainability more generally. Many socio-technical systems – such as in energy and agriculture – remain intransigently locked into unsustainable paths. Many global governance regimes – such as for climate – have collapsed, while others have never taken off. The discussion above indicates some of the key conditions that global assessments need to satisfy if they are to achieve normative and epistemic legitimacy, namely key framing assumptions need to be explicit, appropriate and adequate to problems being analysed. The challenge of how

international collaborative assessments of key parameters of (us)sustainability can gain policy traction with international organisation and national governments, however, remains to be addressed.

References:

- Bill and Melinda Gates Foundation, Agricultural Development Strategy Overview. Available at: <http://www.gatesfoundation.org/What-We-Do/Global-Development/Agricultural-Development#OurStrategy> [Accessed May 2, 2014].
- CFS, 2012. *Global Strategic Framework for Food Security and Nutrition*, Rome. Available at: www.fao.org.
- Chandler, J., 2012. Hungry for Change. *The Age*. Available at: <http://www.theage.com.au/national/hungry-for-change-20120618-20k6t.html#ixzz1yDhucGDj> [Accessed October 10, 2013].
- Dreier, L., 2012. A Shared Agenda to Grow Africa. May 15th 2012. Available at: <http://forumblog.org/2012/05/a-shared-agenda-to-grow-africa/> [Accessed July 20, 2012].
- Duncan, J., 2013. Key themes in global food security policy: a transnational analysis.
- Duncan, J. & Barling, D., 2012. Renewal through Participation in Global Food Security Governance : Implementing the International Food Security and Nutrition Civil Society Mechanism to the Committee on World Food Security. *International Journal of the Society of Agriculture and Food*, 19(2), pp.143–161.
- FAO, Committee on World Food Security. Available at: <http://www.fao.org/cfs/cfs-home/cfs-about/en/> [Accessed September 27, 2013].
- FAO, 2009. *How to Feed the World in 2050*, Rome. Available at: http://www.fao.org/fileadmin/templates/wsfs/docs/expert_paper/How_to_Feed_the_World_in_2050.pdf [Accessed November 16, 2012].
- FAO, 2002. *The State of Food Insecurity in the World 2001*, Rome.
- FAO, 1997. *Women: The key to food security*, Rome. Available at: <http://www.fao.org/docrep/X0171E/X0171E00.htm>.
- Feldman, S. & Biggs, S., 2012a. International Shifts in Agricultural Debates and Practice: An Historical View of Analyses of Global Agriculture. In W. B. Campbell & S. Lopez Ortiz, eds. *Integrating Agriculture, Conservation and Ecotourism: Societal Influences*. Dordrecht: Springer, pp. 107–163.
- Feldman, S. & Biggs, S., 2012b. The Politics of International Assessments: The IAASTD Process, Reception and Significance. *Journal of Agrarian Change*, 12(1), pp.144–169. Available at: <http://doi.wiley.com/10.1111/j.1471-0366.2011.00333.x>.
- Foresight, 2011a. *The Future of Food and Farming : Challenges and choices for global sustainability. Final Project Report*, London.
- Foresight, 2011b. *The Future of Food and Farming: Challenges and choices for global sustainability, Executive Summary*, London.
- G20, 2011. Ministerial Declaration: Action Plan on Food Price Volatility and Agriculture. Meeting of G20 Agriculture Ministers Paris, 22 and 23 June 2011. In *Meeting of G20 Agriculture Ministers*. Paris, pp. 1–24.
- Garnett, T., 2013. Three perspectives on sustainable food security: efficiency, demand restraint, food system transformation. What role for LCA? *Journal of Cleaner Production*. Available at: <http://linkinghub.elsevier.com/retrieve/pii/S0959652613005064> [Accessed August 7, 2013].

- Giovanucci, D. et al., 2012. *Food and Agriculture : The future of sustainability. A strategic input to the Sustainable Development in the 21st Century (SD21) project*, New York.
- IAASTD, 2009a. *Agriculture at the Crossroads Summary for Decision Makers of the Global Report*, Washington: Island Press.
- IAASTD, 2009b. *Agriculture at the Crossroads Synthesis Report: A Synthesis of the Global and Sub-Global IAASTD Reports*, Washington: Island Press. Available at: <http://www.agassessment.org/>.
- Lang, T., 2010. Crisis? What Crisis? The Normality of the Current Food Crisis. *Journal of Agrarian Change*, 10(1), pp.87–97. Available at: <http://doi.wiley.com/10.1111/j.1471-0366.2009.00250.x> [Accessed November 1, 2012].
- Lang, T. & Barling, D., 2012. Food security and food sustainability: reformulating the debate. *The Geographical Journal*, 178(4), pp.313–326. Available at: <http://doi.wiley.com/10.1111/j.1475-4959.2012.00480.x> [Accessed September 21, 2013].
- Lee, R.P., 2013. The Politics of International Agri-food Policy : discourses of trade-oriented food security and food sovereignty. *Environmental Politics*, 22(2), pp.216–234. Available at: <http://dx.doi.org/10.1080/09644016.2012.730266>.
- Lipton, M., 1977. *Why Poor People Stay Poor: Urban Bias in World Development*, Cambridge, MA: Harvard University Press.
- Margulis, M.E., 2013. The Regime Complex for Food Security: Implications for the Global Hunger Challenge. *Global Governance*, 19, pp.53–67.
- McKeon, N., 2011. *Global Governance for World Food Security: A Scorecard Four Years After the Eruption of the "Food Crisis,"* Berlin. Available at: <http://acuns.org/wp-content/uploads/2012/06/Global-Governance-for-World-Food-Security.pdf>.
- Meeker, J. & Haddad, L., 2013. *A state of the art review of agriculture-nutrition linkages*, Available at: <http://agridiet.ucc.ie/wp-content/uploads/sites/2/2013/10/AgriDiet-GlobalReview-FINAL-22-10-13.pdf>.
- Millstone E, 'Chronic Hunger: a problem of scarcity or inequity?', Ch. 15 in Mehta, L (ed) *The Limits to Scarcity: Contesting the Politics of Allocation*, Earthscan London, 2010; Orient BlackSwan, Hyderabad, 2011
- Pearce, S., 2012. Wilton Park Conference Report: Improving diet and nutrition: challenges for global food, agricultural and land use policies Monday 23 – Wednesday 25 April 2012. WP1157. In Wilton Park. Available at: <https://www.wiltonpark.org.uk/wp-content/uploads/WP1157-report.pdf>.
- Schutter, O. De, 2013. *Interim report of the Special Rapporteur on the right to food*,
- Scoones, I., 2008. *Global Engagements with Global Assessments : The Case of the International Assessment of Agricultural Knowledge , Science and Technology for Development (IAASTD)*,
- Scoones, I., 2009. The politics of global assessments: the case of the International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD). *Journal of Peasant Studies*, 36(3), pp.547–571. Available at: <http://www.tandfonline.com/doi/abs/10.1080/03066150903155008> [Accessed May 31, 2013].
- Sen, A., 1983. *Poverty and Famines: An Essay on Entitlement and Deprivation*, Oxford: Oxford University Press.
- STEPS, 2010. *Innovation, Sustainability, Development: A New Manifesto*, Brighton. Available at: http://steps-centre.org/wp-content/uploads/steps-manifesto_small-file.pdf.

- Stirling, A., 2009. *Direction, Distribution and Diversity! Pluralising Progress in Innovation, Sustainability and Development*, Brighton. Available at: www.steps-centre.org.
- Stirling, A., 2001. Inclusive deliberation and scientific expertise: precaution, diversity and transparency in the governance of risk. *PLA Notes*, (40), pp.66–71. Available at: <http://pubs.iied.org/pdfs/G01937.pdf>.
- Stirling, A., 1998. Risk at a turning point? *Journal of Risk Research*, 1(2), pp.97–109. Available at: <http://www.tandfonline.com/doi/abs/10.1080/136698798377204> [Accessed March 28, 2014].
- Sumberg, J., Thompson, J. & Woodhouse, P., 2012. Contested Agronomy: Agricultural Research in a Changing World. In J. Sumberg & J. Thompson, eds. *Contested Agronomy: Agricultural Research in a Changing World*. Abingdon: Routledge.
- Thompson, J. & Scoones, I., 2009. Addressing the dynamics of agri-food systems: an emerging agenda for social science research. *Environmental Science & Policy*, 12(4), pp.386–397. Available at: <http://linkinghub.elsevier.com/retrieve/pii/S1462901109000458> [Accessed December 13, 2013].
- United Nations, 2008. *The Millennium Development Goals Report, Addendum 2008*, Available at: http://www.un.org/millenniumgoals/2008highlevel/pdf/MDG_Report_2008_Addendum.pdf.
- van Zwanenberg P & Millstone E, 'Beyond sceptical relativism: evaluating the social constructions of expert risk assessments', *Science, Technology & Human Values*, Vol. 25, No 3, Summer 2000, pp. 259-282
- WEF, 2012. Putting the New Vision for Agriculture into Action: A Transformation is Happening. Available at: http://www3.weforum.org/docs/WEF_FB_NewVisionAgriculture_HappeningTransformation_Report_2012.pdf [Accessed July 20, 2012].
- WEF, 2010. *Realizing a New Vision for Agriculture : A roadmap for stakeholders*, Geneva. Available at: http://www3.weforum.org/docs/WEF_AgricultureNewVision_Roadmap_2011.pdf.
- WFS, 1996. Rome Declaration on World Food Security, World Food Summit, 13-17 November, 1996. In Rome: FAO. Available at: <http://www.fao.org/DOCREP/003/W3613E/W3613E00.HTM>.
- Willis, K., 2005. *Theories and Practices of Development*, Oxon: Routledge.
- Wise, T.A. & Murphy, S., 2012. *Resolving the Food Crisis Assessing Global Policy Reforms Since 2007*, Global Development and Environment Institute, Institute for Agriculture and Trade Policy.
- World Bank, 2007. *World Development Report 2008: Agriculture for Development*, Washington.

Appendix 1 Matrix

1 Diagnosis, objectives, assumptions	IAASTD 2009	Foresight 2011	UN DESA 2012
<p>Core concerns?</p> <p>Problem(s) needing solving</p>	<p>Focus on AKST, and how it can best be used to address the sustainability and development challenges facing the global agri-food system.</p> <p>Ie: 1) Decrease hunger and improve health and human nutrition 2)Decrease poverty and improve rural livelihoods, 3) Increase environmental sustainability 4) Improve social sustainability and increase equity, 5) Governance mechanisms for improved institutional and organisational arrangements.</p>	<p>How to feed a growing population “sustainably and equitably”</p> <p>current levels of hunger, sustainability of production systems, reducing GHG emissions from the ag system</p>	<p>‘Sustainability’, rather than food security.</p> <p>How to maintain or increase production within ecological limits.</p>
<p>Does the report state goals for the food system?</p>	<p>Poverty reduction and sustainable development closely linked to issues of equity</p>	<p>To ensure a system which can feed the world sustainably in 2050 – but no specific targets</p>	<p>A ‘paradigm’ shift to “...define the goal in terms of human nutrition” and a focus on access as well as production.</p>
<p>Which ‘facts’ and assumptions inform problem identification?</p>	<p>The benefits of AKST have been unevenly distributed, and have privileged the more powerful and richer.</p> <p>The direction of the global agri-food system has been shaped by the interests of industrialised nations, while local knowledge, culture, interests and ecosystems have been disregarded.</p>	<p>Population growth natural resource depletion, climate change, access and distribution, wealthier populations’ changing diets</p>	<p>Population growth and urbanisation, leading to changing diets (though this is not inevitable).</p> <p>A need to increase production, a need for production methods to reflect and respond to resource scarcities and the multiple uses of ecosystem resources.</p>

1 Diagnosis, objectives, assumptions	IAASTD 2009	Foresight 2011	UN DESA 2012
	National and international policy instruments have similarly been inequitable. By focusing on production and profit, not sustainability and development goals, entails that the agri-food system is inequitable.		Assumes dominance of market-based approaches to stimulating changes in production, distribution, supply.
How is 'sustainability' characterised?	Broadly, including social, economic and environmental sustainability.	GHG emissions, land, water, soil, biodiversity degradation, unsustainable production systems	Resources: land, water, energy scarce and expensive, maintaining ecosystems and biodiversity within the context of climate change
What is to be sustained? What could be a sustainable system?	Rural livelihoods, and the natural resources on which rural communities depend.	'Sustainability' defined as: 'meeting the needs of present populations without harming natural assets or reducing the future ability of populations to meet their needs.'	'Sustainability' defined as: "... an optimal balance of the social, environmental and economic aspects of agriculture"
How does the report define the 'multi-functionality' of agriculture?	'Multi-functionality' is repeatedly stressed and is "used solely to express the inescapable interconnectedness of agriculture's different roles and functions. The concept of multi-functionality recognizes agriculture as a multi-output activity producing not only commodities (food, feed, fibres, Agro-fuels, medicinal products and ornamentals), but also non-commodity outputs such as environmental services, landscape amenities and cultural heritages.	Multiple goals of the food system, with multiple functions of particular ecosystems e.g. aquatic zones	'Multi-functionality' used to refer to agriculture having more outputs than just food production, and its role in "managing resources and the environment for multiple and interrelated purposes

1 Diagnosis, objectives, assumptions	IAASTD 2009	Foresight 2011	UN DESA 2012
<p>How are past, present and future pressures characterised? Are future pressures considered inevitable?</p>	<p>Recognition of negative environmental, social, economic and equity impacts of past practices.</p> <p>Current focus on how changing the political basis for policy choices could redirect the system</p>	<p>Future pressures are the key concern of the report, which focussed on the functioning of the food system to 2050.</p> <p>However, it called for current problems to be kept in sight, and noted that currently “Much of the responsibility for ... three billion people having suboptimal diets lies within the global food system”</p> <p>Pressures such as increasing population and competition for natural resources, changing diets, climate change and globalisation are seen as inevitable.</p>	<p>Recognised negative environmental impacts of past approaches and failures to address hunger and malnutrition. Presents different future scenarios, highlighting areas of consensus and examines the consequences of anticipated choices.</p>
<p>Selection and characterisation of trends affecting the global food system?</p>	<p>Challenge is simultaneously to meet ‘developmental’ and ‘sustainability’ goals while increasing agricultural production’</p> <p>Drivers of change include urbanisation, growing inequity, migration, globalisation, dietary preferences, climate change, biofuels and environmental degradation. Report focused on ‘issues critical to formulating policy’ including: bioenergy, biotechnology, climate change, human health, natural resource management, trade and markets, traditional and local knowledge and community-based innovation, women in agriculture.</p>	<p>The central concern of the report was with ‘sustainable production’, and the trends which increase pressures on production systems were highlighted</p> <p>The discussion neglected ‘demand side’ issues and made no reference to ‘sustainable consumption’</p>	<p>The overview identified key trends as: changing dietary habits, biofuel production and energy markets, waste, price volatility, changing governance structures and influence of technology but not (explicitly) hunger or poverty.</p>

1 Diagnosis, objectives, assumptions	IAASTD 2009	Foresight 2011	UN DESA 2012
Dominant drivers of change?	<p>Recognised that increasing agricultural production had imposed (unintended) social and environmental costs, which must now be addressed.</p> <p>Dominance of industrialised world in global value chains for exports, and use of AKST have focused mostly on the needs and interests of those in the industrialised world.</p> <p>Current regime fails to address: “...fundamental questions of relationships among production, social and environmental systems...”</p> <p>Critical of scientists’ narrow focus on “...delivering component technologies to increase farm-level productivity...” and externalisation of costs to reduce farm-gate prices.</p> <p>Critical of ‘NRM’ and narrow focus on increasing productivity to the exclusion of all other goals</p>	<p>Recognises a need to avoid and replace ‘unsustainable production methods’ which have depleted natural resources, contributed to climate change, hunger and over-consumption.</p>	<p>Critical of narrow focus on outputs i.e. supply not demand, production not nutrition, yield increases not resource management, and externalisation of environmental costs.</p>

1 Diagnosis, objectives, assumptions	World Economic Forum 2010	G20 2011	CFS 2012
<p>Core concerns?</p> <p>Problem(s) needing solving</p>	<p>Increasing food production within limited environmental resources: “produce more with less”</p> <p>Meet basic social needs, defined as reducing poverty through economic growth.</p>	<p>Short-term problem: food price volatility</p> <p>Long-term problem: improving ‘food security’</p>	<p>Prevailing levels of hunger and malnutrition</p>
<p>Does the report state goals for the food system?</p>	<p>Targets set: increase production by 20%, decrease emissions by 20%, reduce poverty by 20% each decade to 2050</p>	<p>No specifics, just a generic goal of ‘improving global food security’</p>	<p>Aims at “a world free from hunger”. The “main objective of food security policies” is the right to adequate food</p>
<p>Which ‘facts’ and assumptions inform problem identification?</p>	<p>Assumes need to raise production to meet increasing demand from predicted population growth, growing middle classes and increasing consumption of meat and dairy at global level.</p> <p>Assumes linear relationship between agricultural development, economic growth, poverty reduction and improved food security.</p> <p>Assumes agricultural production methods will have to adapt to climate change,</p>	<p>Population increases are taken for granted.</p> <p>Poorly functioning markets are assumed to disincentivise increasing production of staple crops, which will be pivotal to reducing hunger and feed growing populations</p>	<p>Assumed that price volatility has impact on current and continuing levels of hunger and malnutrition</p>
<p>How is ‘sustainability’ characterised?</p>	<p>GHG emissions, soil fertility, species diversity, water availability and quality.</p> <p>Targets are (only) set for GHG emissions and water use.</p>	<p>Sustainability was not defined, concerns included: land, water, biodiversity, climate change adaptation and mitigation. Also concern with ‘sustainable bioenergy’</p>	<p>‘Sustainability’ remained undefined, but CFS called for “socially, economically and environmentally sustainable agriculture”</p> <p>Environmental concerns included resilience to climate change and importance of: land, water, forests,</p>

1 Diagnosis, objectives, assumptions	World Economic Forum 2010	G20 2011	CFS 2012
			fisheries, biodiversity, ecosystem services, genetic resources
What is to be sustained? What could be a sustainable system?	Global food production levels.	This is not defined	A sustainable system conserves all the natural resources listed above while eradicating hunger and “enhancing resilience to climate change and natural disasters”
How does the report define the ‘multi-functionality’ of agriculture?	It did not do so.	‘Multi-functionality’ is not mentioned. No other terms were defined.	‘Food security’ and ‘right to food’ were specifically defined. Terms such as ‘sustainable’, ‘resilient’ are not. ‘Multi-functionality’ was not mentioned, but the multiple uses of different natural resources was recognised, particularly in relation to ‘Tenure of land, fisheries and forests’ ie ownership, access and control
How are past, present and future pressures characterised? Are future pressures considered inevitable?	Recognition of negative environmental impact of past approaches, and failure of past approaches to address hunger and malnutrition. Future approaches have to address these problems. Future pressures and constraints are inevitable.	Future pressures, such as resource scarcity, population growth and climate change, are considered inevitable. Increasing production for future demand, and addressing current price volatility are characterised as “mutually reinforcing challenges” Past pressures not specifically identified. Problems to be addressed are implied in the recommendations, not stated directly e.g. call to address waste, improve ag research	The report focused on current pressures, and only briefly considers emerging challenges, which included population growth and increasing urbanisation. Argued that re-focusing policies on the ‘right to food’ will create a system able to deal with current and future pressures.

1 Diagnosis, objectives, assumptions	World Economic Forum 2010	G20 2011	CFS 2012
Selection and characterisation of trends affecting the global food system?	Increasing demand and constrained resources, increasing importance of downstream players (eg processors) in shaping the food system, shift of yield increases from developed to developing countries. These were all portrayed as 'inevitable'.	Focused almost exclusively on market functioning and price volatility as key indicators of the system's ability to ensure 'global food security'. Also called for 'better international policy coordination and implementation of international political commitments'. Focused on 5 topics: agricultural production, market functioning, international policy coordination, risk management and financial/commodities markets.	Identified wide range of causes of food insecurity, eg 'governance', resource depletion, low productivity, poor market functioning. Strategies to address those drew on a frameworks including MDGs, Rome Principles, VolGuideRtF, UNCFA and other international guidelines, documents and conventions.
Dominant drivers of change?	Inefficiencies, low productivity and poor resource management causes of current problems, so focussed on increasing cereal production rather than a more diverse range of crops.	Key cause of food insecurity considered to be 'poorly functioning markets', leading to low productivity and low farm incomes.	Underlying structural causes of hunger are grouped under 4 headings: 1) governance, 2) economic and production issues, 3) demographic and social issues, and 4) climate/environmental problems. Hunger and malnutrition, and the non-delivery of a range of rights, are understood as consequential.

2 Factors affecting the problem and drivers of change	IAASTD 2009	Foresight 2011	UN DESA 2012
What factors are considered to influence the problem? e.g. climate change, population growth, changing diets	As well as themes identified, and examined individually (see above), IAASTD considered the failure to value the multiple functions of agriculture as a key factor leading to the other problems. Thus other policies, eg trade & IPRs, are currently not directed at development and sustainability outcomes.	Population growth (especially in low and middle income countries), changing diets, climate change, competition for resources from other sectors, globalisation, market concentration, governance issues, waste, poorly functioning markets and a distorted multi-lateral trading system.	External to the agriculture sector: population growth, climate change, land degradation, water scarcity, impact of energy markets. Internal: waste, dietary transitions, changing governance and organisations, in particular, increasing role of private sector, increased concentration and global integration
Are risks and uncertainties identified? If so, what sorts, and at what levels?	<p>Talked about multi-functionality, complexity, governance, social justice, risks, and the fact that risks are unequally spread.</p> <p>Risk, uncertainty and variable impacts on different sectors of society are key themes of the report eg lack of evidence regarding impacts of GMOs and non-existence of a ‘silver bullet’ technological solution</p> <p>Similarly, uncertain impacts of biofuel production are described, as well as biotechnology, IPRs (which might drive up costs, restrict other research, and</p>	Health risks associated with poor diet, risks and benefits associated with new technologies, risk management for vulnerable communities (ie social safety nets), risks and benefits associated with alternative policy choices	Risks to resilience of system and human health from decreasing biodiversity and increased supply chain concentration, risk to productive resources from environmental degradation, financial risk to smallholder farmers from market volatility, uncertain impacts of climate change.

2 Factors affecting the problem and drivers of change	IAASTD 2009	Foresight 2011	UN DESA 2012
	<p>other traditional food security strategies such as seed saving), climate change.</p> <p>Development and sustainability goals have to be placed in the context of social and economic inequities, political uncertainties, uncertainties about future production, access, price of food, natural resource competition, human responsibility for environmental and climate challenges, energy sector, health issues.</p>		
<p>Does it take into account complexities?</p> <p>If so how?</p>	<p>Notes the utility of technologies depend on societal outcomes, and that there are costs, benefits and trade-offs Advocating a “fundamental shift in AKST” to recognise multi-functionality of ag, while acknowledging complexity and diversity of ag systems, social and ecological contexts within which AKST has to operate.</p> <p>Dynamic systems – constantly changing, often in response to human activities Management of infectious disease through multi-sectoral co-ordination, management of chronic disease through food labelling, legislation, regulation.</p>	<p>Complexity of the food system and its interaction with other sectors is highlighted, along with an acknowledgement of the uncertainties and complexities of evidence on which policy choices have to be based.</p>	<p>Acknowledged complexity of food system and the interaction of multiple factors affecting its functioning lead to proposing context-specific solutions rather than one-size-fits-all approach</p>

2 Factors affecting the problem and drivers of change	IAASTD 2009	Foresight 2011	UN DESA 2012
How does it take into account the impacts of interactions between different factors? e.g. equity issues	Equity issues are an explicit focus of the report; policy options are judged by reference to their impact on development and sustainability goals, so a ‘problem-oriented approach to biotechnology’, ie one that directs research towards local priorities identified in participatory ways enabling “..the public to critically engage in assessments of the technical, social, political, cultural, gender, legal, environmental and economic impacts of modern biotechnology.”	The interactions amongst drivers of change is highlighted, and their impacts on vulnerable households is considered, but ‘equity’ is barely mentioned. Prioritisation of different outcomes from the food system, and trade-offs between different policy choices are highlighted. Beddington had defined food security as ‘sufficient, sustainable safe and equitable’, though consideration of trade-offs relating to emissions and climate change impacts does not discuss the distribution on impacts.	Implicitly considers the impact of ‘Subsidies for foods that do not contribute to public health’ and the impact of industrial food processing technology, but conflates problems in developed with developing countries. Does not pinpoint which subsidies are problematic or clarify who benefits from them.
How are the responsibilities of, and relationships between, developed and developing countries characterised?	Did not target or prioritise particular actions, but rather argued that policy changes are need at many different levels by different bodies.	The executive summary did not disaggregate these, but the full report included separate recommendations for action by international bodies, national governments, EU countries and developing countries, as well as other stakeholders	Policy recommendations were not directed at specific groups, portrayed rather as applicable to all.
2 Factors affecting the problem and drivers of change	World Economic Forum 2010	G20 2011	CFS 2012

<p>What factors are considered to influence the problem? e.g. climate change, population growth, changing diets</p>	<p>Climate change, waste and inefficiency along the food chain, technological and institutional bottlenecks; as well as poor basic services such as education and health</p>	<p>Population growth (especially in countries currently food insecure), natural resource management, ‘short-term’ food price volatility, climate change, poorly regulated agricultural financial markets, lack of enabling environment for investment</p>	<p>Governance issues, rights (including tenure rights) and discrimination are all highlighted. Other relevant factors include climate change, demographic changes, the impact of biofuels policies, a distorted multi-lateral trading system, inadequate basic services, lack of access to productive resources (including knowledge), degradation of natural resources, inadequate disaster preparedness and lack of political commitment</p>
<p>Are risks and uncertainties identified? If so, what sorts, and at what levels?</p>	<p>Global price volatility, stakeholders can mitigate their risks by coordinating and sharing skills. Civil society has role in managing community level risks... Climate change risks, to be mitigated by technological innovations Financial risk, for farmers – market risk is seen as being borne by producers – functioning market needed to address this</p>	<p>Managing the risks associated with ‘excessive’ price volatility is a priority. Risk is considered at the level of government, private sector and farmers, and on the most vulnerable. Solutions include targeted safety nets, and a ”market-based risk management tool box” to reduce household and community vulnerability, operating at the national level</p>	<p>A wide range of risks were considered, at multiple levels eg national level risk management strategies to cope with price volatility, risks and uncertainties caused by climate change, particularly faced by producers, risks associated with abuse of tenure rights, particularly for marginalised communities, disaster risk reduction plans, financial risk reducing incentives to investors</p>
<p>How does it take into account complexities</p>	<p>Referred to complexity of ag system, but solutions are in terms of separate stages of the supply/value chain; refers to “complex social needs” but says they can and should be addressed through technological innovation</p>	<p>Diverse contexts are mentioned once, complexity not at all. The focus of the report is the agriculture sector, trade and financial markets, and other sectors are not considered</p>	<p>Complexity of the food system and the interaction of multiple factors affecting its functioning are highlighted. The interactions between different sectors is considered. Context-specific approaches for countries in protracted crisis are called for.</p>
<p>How does it take into account the impacts of interactions</p>	<p>Interactions between health and agricultural production are discussed – poverty as a cause and consequence of malnutrition and under-production, similarly education is seen as a means of</p>	<p>The need to protect vulnerable households and communities is acknowledged, the interaction of climate change with agricultural productivity is recognised.</p>	<p>The report takes a rights-based approach and stresses the impact of discrimination on food insecurity and hunger. The need for policy coordination across sectors is</p>

<p>between different factors? e.g. equity issues</p>	<p>improving productivity and therefore reducing poverty. "...equitable human development" is seen as desirable, but the impact of policy choices on equity is not discussed. Gender equity considered as a public good Equity is government responsibility</p>		<p>highlighted, including sectors such as labour law.</p>
<p>How are the responsibilities of, and relationships between, developed and developing countries characterised?</p>	<p>They were not delineated.</p>	<p>They are not specifically disaggregated, but the report highlights the importance of international governance, upholding international commitments and the need to support country-level programmes and policies.</p>	<p>They are not specifically disaggregated, but the report highlights the importance of international governance, upholding international commitments and the need to support country-level programmes and policies. The impact of distorted trade regimes is stressed, along with implicit criticism of food aid strategies (</p>

3 Scope of the problem?	IAASTD 2009	Foresight 2011	UN DESA 2012
How is the agriculture sector delineated? eg are biofuels considered part of the sector?	Interaction of multiple related factors – biofuels including traditional fuel sources considered. Interprets agriculture broadly to include food, fuel, feed and fibre, and takes an overview of the entire food chain. Also highlights links with other sectors eg health, trade & NRM	Widely – fisheries, wild foods are considered	Biofuels are considered to be a separate but closely linked sector.
How are the actors within the sector identified and their roles delineated? Eg smallholder farmers, women	Women in ag: current systems are changing the role of women in ag e.g more migrant labour in export-oriented production, but also reinforces exclusion and exploitation. Women in ag: strengthen public institutions and NGOs, improve education, access to extension services, ownership and legal rights, access to credit, target tech devts to women’s needs, better assessments of health risks of working conditions.	Report takes a multi-stakeholder approach, recognising roles for different groups, including consumers, particularly in industrialised countries. Role of women in agriculture is an issue.	p.63 – government investment for filling in the gaps in private funding e.g. extension, food security, land tenure Women are specifically mentioned as a key group of smallholder farmers who should be supported.
What sorts of agricultural technology and research are considered ie what is included in the definition of agricultural technology and	Advocated a “fundamental shift in AKST” to recognise multi-functionality of ag, complexity and diversity of ag systems, social and ecological contexts within which AKST has to operate. Recognises that the usefulness of any technology depends on societal outcomes, and that there are costs, benefits and trade-offs.	Report considered new technologies and how to evaluate them. It highlighted the value of existing knowledge and technology, it emphasises technology relating to improving productivity or other production characteristics.	Technology and innovation were understood at multiple scales, and the report called for more recognition of context-specific innovations based on local knowledge, and indigenous technologies particularly for natural resource management. Technologies along the value chain eg storage, communications, financial instruments are also considered.

3 Scope of the problem?	IAASTD 2009	Foresight 2011	UN DESA 2012
research used by the report?	<p>Provision through AKST of site-specific crops and NRM, pest management and livelihood diversification.</p> <p>Research and technology at multiple scales eg to strengthen local markets and safety nets, and to improve global monitoring and early warning.</p> <p>Management of infectious disease through multi-sectoral co-ordination</p>		
Are interactions with other sectors eg health considered?	<p>Yes. Eg Health policy options include fiscal policies, regulation of food product formulation, labelling, commercial information, and occupational health should be addressed by regulation, enforcement and risk assessments. Also strengthened food safety measures, across the global value chains.</p> <p>NRM: holistic, systems-approach to address complexities and differences across different agro-ecological systems.</p> <p>Trade: "differentiation in policy frameworks and institutional arrangements"</p>	<p>Yes: policy coherence was called for, and a policy approach recognising the interactions between multiple sectors, Recommended action across "several policy domains"</p>	<p>Interactions with energy sector, impact of current functioning of agriculture sector on health</p>
Does the report take a position on factors beyond agricultural production systems e.g. financial	<p>Yes: eg trade policy reform to increase 'fairness', national policy flexibility, increasing value "captured by small-scale farmers", addressing market failure to value environment, improving property rights, improving transparency and governance, more participation from a</p>	<p>Yes – financial speculation, global trade regimes, corporate concentration in the food sector, global governance are all considered.</p>	<p>Minimally – they are included in the analysis but not in the suggested solutions</p>

3 Scope of the problem?	IAASTD 2009	Foresight 2011	UN DESA 2012
speculation on food commodity markets, trade regimes, global governance systems, agricultural subsidies in industrialised countries, role of TNCs etc.	wider range of stakeholders, better assessment of impacts of trade policies. Similar approach to health policy Integrated approaches, linking ag, human health, animal health e.g. diversification of diets, investment in national and international food safety systems and infrastructures. GHG options: "...equitable regulatory framework, differentiated responsibility and intermediate targets are required to reduce GHG emissions."		
What scales of analysis are used (household, national, global) and are interactions between scales explored?	Global and sub-global reports, which were integrated and synthesised. Recommends shared approaches, collective agreements, concerted actions and across multiple scales, and different social contexts.	The impact of policies at different scales was considered. Policy recommendations were mainly at the level of national, regional or global level, but some recommendations for action by consumers and civil society groups were included.	Report acknowledged the difficulty of downscaling: "...from the global scale to the more regional/national/local scale" because of lack of involvement of farmers/producers. Report written by global level players. But acknowledged the different impacts of policies on different stakeholders at different scales, and a need for local interpretation of approaches, and adoption of locally-developed technologies, as well as the need to strengthen local markets and produce for local consumption – not just integrate farmers into a global value chain. Advocated building local technical capacities – and support for low-cost technologies accessible to poor farmers to increase yields and natural resource management

3 Scope of the problem?	World Economic Forum 2010	G20 2011	CFS 2012
How is the agriculture sector delineated? Eg are biofuels considered part of the sector?	Biofuels and forestry considered as separate sectors which compete for resources	The sector is considered narrowly – biofuels are considered separately, ecosystem services not mentioned	Widely – fisheries, forests, wild foods are all considered.
How are the actors within the sector identified and their roles delineated? Eg smallholder farmers, women	Smallholder farmers are expected to move from farming for a livelihood to commercial farming, and to integrate into global value chain. They are seen instrumentally, as recipients of knowledge and technology with WEF delivering a ‘new vision to them’. Farmers should become entrepreneurs; women are seen instrumentally as being responsible for family health and nutrition.	Focus was on the private sector, which included smallholder farmers. The special needs of women and young farmers were mentioned, but their roles were not delineated.	Focus was on rights, for small-holder farmers, agricultural workers and women, marginalised and vulnerable groups. Roles of multiple stakeholders at all levels were considered, with stress on a need for participation from stakeholders at all levels.
What sorts of agricultural technology and research are considered ie what is included in the definition of agricultural technology and research used by the report?	Technology seen as being developed at global level and passed from large-scale enterprises to small and medium businesses. Funding for research mentioned several times, but the type of research was left unspecified. Identified a need for research on orphan crops, climate and soil adaptation, and crop and livestock breeding programmes. Extension discussed in terms of private sector becoming involved.	No definition, but the only technology specifically mentioned was plant breeding. Research and technology in “activities strongly linked to agricultural productivity growth” were supported eg irrigation, transport and power.	Not specified
Are interactions with other	Minimally	No	Yes: focus on policy coherence, and policy recommendations “with a direct or

3 Scope of the problem?	World Economic Forum 2010	G20 2011	CFS 2012
sectors eg health considered?			indirect impact on food security and nutrition, such as trade, agriculture, health, environment, natural resources and economic or investment policies.”
Does the report take a position on factors beyond agricultural production systems e.g. financial speculation on food commodity markets, trade regimes, global governance systems, agricultural subsidies in industrialised countries, role of TNCs etc.	No, just one mention of the need for “consistent trade policies” and “a robust global market”.	The report’s main priority was the functioning of food commodity markets and international trade, and it was concerned with global governance but it had nothing to say about the role of TNCs, or the impact of ag subsidies in industrialised countries. Within the ag sector, focus was on production rather than any of the broader system factors affecting food security	Yes – all of these are considered to be factors affecting food security. Protracted crises, discrimination, lack of access to justice are also considered. Governance at global and national level is highlighted.
What scales of analysis are used (household, national, global) and are interactions between scales explored?	They were inter-mixed ie smallholder farmers were the main target of policy recommendations, but businesses and governments operate at a national/bilateral levels, but global policy and governance were not discussed. Global markets and corporates expected	None of the actions called for operate at a scale lower than the national level, though it mentioned the impact of policies and actions on vulnerable households, and was concerned about the functioning of private sector actors in developing countries.	Impact of policies at all scales were considered, with recommendations for action at all scales. The impact of global policies on local level – even household level – were considered.

3 Scope of the problem?	World Economic Forum 2010	G20 2011	CFS 2012
	<p>to play major role re-shaping the agriculture sector.</p> <p>Report written by global level players, to provide “technical know-how” to local entrepreneurs.</p> <p>Report took instrumental view of local inputs eg actions of local entrepreneurs, harnessing local knowledge to ‘maximise adoption’ of new technologies.</p> <p>Acknowledged a need for locally-appropriate options and local decision-making to meet local economic needs.</p> <p>Local business and local community mentioned frequently – but not defined.</p>		

4 Processes by which reports were produced	IAASTD 2009	Foresight 2011	UN DESA 2012
Who was involved?	<p>Initiated by WB and FAO, co-sponsored by FAO, WB, UNDP, UNEP, GEF, UNESCO, WHO.</p> <p>The IAASTD governing Bureau consisted of equal numbers of “geographically balanced” representatives from government and civil society, who selected about 400 experts to work, over three years, on preparing the report.</p>	<p>The project involved “experts and stakeholders” p.11 from about 35 countries and commissioned a range of reports, evidence and economic modelling.</p>	<p>Initiative of UN DESA, as part of the Sustainable Development in the 21st Century project.</p> <p>Project engaged over 60 “thought leaders” (Giovannucci et al, 2012:viii) from 23 countries, chosen by the project co-ordinators. These ‘high-level’ experts are largely from developed or industrialising countries.</p>
How were they involved?	<p>The experts were nominated by stakeholder groups, but “worked in their own capacity”, other individuals and organisations were involved in peer review process.</p>	<p>They were involved through a number of groups e.g. the high level stakeholder group, the project lead expert group, the project team, project advisory group, economic advisory group, and a larger number of authors and contributors to the evidence base. The report does not contain a description of how these different groups related to each other in order to produce the final report</p>	<p>Inputs gathered through focused questionnaires. The responses were collated into representations of four distinct world views, by four co-ordinators, identified by the project leaders. These four syntheses of the expert opinions are further synthesized to produce an overview chapter. The final chapter pulls out areas of consensus and disagreement from the four groups.</p>
How were issues to be considered prioritised / decided?	<p>Lengthy drafting and peer review process, including putting drafts onto open access website, agreement on final drafts at Intergovernmental Plenary.</p>	<p>Information on this is not provided</p>	<p>The experts were asked to identify and prioritise important trends affecting food and agriculture. The report’s authors extracted consensus points and again asked the experts to rank these.</p>
What data were used on which to base policy recommendations?	<p>Wide range, including “information, tools and models from different knowledge paradigms including local and traditional knowledge” p.vii</p>	<p>A large number of commissioned and existing papers. Information on how decisions were made about which papers</p>	<p>Wide range – UN, FAO, IFPRI, academic journals etc. plus experts’ inputs.</p>

4 Processes by which reports were produced	IAASTD 2009	Foresight 2011	UN DESA 2012
	There is a Global assessment and five Sub-Global assessments, incorporating a wide range of stakeholder perspectives.	to commission, on what subjects, is not available	Most data describes global level, though some regional distinctions e.g. data on waste is from US.
Were different voices considered/ acknowledged? Was there any acknowledgement of different perspectives?	Yes: IAASTD was established as a multi-sectoral, multi-stakeholder process which aimed to be open, transparent and representative. It presents policy options not recommendations in order to take into account different worldviews.	Yes – there is acknowledgement of uncertainty in the evidence base, as well as social, cultural and political considerations affecting policy choices	UNDESA specifically presents the perspectives of four different ‘world views’, bringing them together in an overview chapter, and concluding with a description of areas of consensus. The report acknowledges that more producers, consumers and rural community members could have been involved and that the high-level approach does not give a full picture.
Where does the report / institution place itself within the debate and in relation to other institutions?	The process was sponsored by several UN agencies and WB, and was approved (with caveats) by 58 governments.	The report is produced for the UK government, but has a global perspective. It includes recommendations for action by UN and other international bodies, as well as national governments across the globe.	SD21 is a UN project, co-funded by EC, to provide inputs to the UNCSD (Rio+20) in 2012. This is one of 8 reports produced as part of SD21, which aims to provide a “frame of analysis against which other, more normative or prescriptive reports can be read.” (UN, 2012: 1)
What is the relevance and authority of the report?	Some countries (including US) expressed reservations about some aspects of the final reports and have undermined its authority since publication.		Although produced by UN, its focus on sustainable development gives it less authority within food and agriculture debates (perhaps)

4 Processes by which reports were produced	World Economic Forum 2010	G20 2011	CFS 2012
Who was involved?	Initiative led by 17 global food industry companies, engaged 350 leaders in business, government, civil society, international organizations and academia, and farmer leaders. McKinsey & Co (project adviser) IFPRI (knowledge partner) WEF Global Agenda Council on Food Sec. Schwab Foundation for Social Entrepreneurs	G20 agriculture ministers	CFS participants are UN Member States & UN bodies, CSO and NGO networks, ag research bodies, IFIs, private sector reps, philanthropic bodies
How were they involved?	TNCs: project board and working group members WEF: Project Director WEF GACFS: review and advisory support IFRPI and academics: expert reviewers Schwab Foundation: input, but the type not defined Farmer leaders, business leaders, government, civil society participated in regional leadership dialogues but details (when, where, how many participants) not reported.	Report is the outcome of a two-day meeting, but based on prior work by ‘sherpas’.	GSF approved at CFS Plenary, at which only Member States can vote.
How were issues to be considered prioritised / decided?	No information provided. Process opaque.	Arose from decisions made at previous G20 summits, and commitments made by eg at L’Aquila in 2009. No information about why or how food price volatility was prioritised was provided.	It drew on earlier documents and commitments, and aimed to “ensure coherence between them”. It was prepared in the light of global and regional frameworks and plans relating to Food Sec. and Nutr, and drew on

4 Processes by which reports were produced	World Economic Forum 2010	G20 2011	CFS 2012
			inputs from the High Level Panel of Experts
What data were used on which to base policy recommendations?	None of the data used in the report are fully referenced. Sources include FAO, other UN bodies, Gates Foundation, IFRPI and TNCs' own data. Data focused on the agriculture sector's global aggregate contribution to GHG emissions, water use, employment and food production. Data also covered soil degradation, health and nutrition, education, economic growth and gender inequality.	The report 'welcomed' a range of inputs, including a multi-agency policy report on food price volatility, statements of the "G120", WEF, G20 Finance Ministers, CFS, CGIAR, GAFSP and other similar bodies.	UN documents, MDGs, G20 commitments, FAO resources and IAASTD.
Were different voices considered/acknowledged? Was there any acknowledgement of different perspectives?	No	No.	Yes – the CFS had been established to be an “inclusive international and intergovernmental platform for a broad range of committed stakeholders to work together in a coordinated manner and in support of country-led processes”
Where does the report / institution place itself within the debate and in relation to other institutions?	Outside: No reference to global governance or institutions, partnerships developed bilaterally in specific countries.	The report placed itself centrally in relation to UN and other international governance structures, urging action by others (but no concrete support), 'welcoming' their work, and setting up (possibly parallel?) international governance structures	It built on and incorporated policies and analyses from global and regional institutions, and aimed to “to improve coordination and guide synchronized action” by stakeholders. It offered guidelines and recommendations but was not a legally binding document

4 Processes by which reports were produced	World Economic Forum 2010	G20 2011	CFS 2012
What is the relevance and authority of the report?	Authors (signatories?) exert relevant pressure and influence financial and political powers	Signatories exert relevant influence and have authority over financial and policy institutions.	Authority came through engagement, and representation, of a wide range of stakeholders at multiple levels, and the open process of deliberation.

5 Proposed solutions	IAASTD 2009	Foresight 2011	UN DESA 2012
What solutions were proposed, and what was not included?	IAASTD said it was not policy prescriptive, did not propose specific solutions, but presented a range of options for actions to meet development and sustainability goals. But IAASTD's assessment was that small-scale farming and agro-ecological approaches were more likely to produce pro-poor outcomes that industrialised farming in UDCs	Many recommendations including improving productivity sustainably, investing in research, improving market functioning, improving global trade rules, improving extension services, empowering women, improving monitoring and accountability, improving governance, strengthening land and other resource rights, integrating agriculture and climate change goals.	Investment in smallholder farmers, reduce waste, incentivise sustainability standards in private sector, address problem of biofuel production, improve governance, more appropriate use of technology and support for innovation at different scales.
What sorts of agricultural systems were recommended for developing countries eg cash crops for export? Crops for local consumption? Agro-ecological approaches?	Systems should acknowledge the multi-functionality of agriculture and not privilege one function (ie production) over others. Systems which are focused on the needs of farming communities, with opportunities for poor countries to manage their agriculture system to provide pro-poor outcomes.	The report stated that self-sufficiency is not an option for any country, and food security can only be achieved by participation in a globalised food system.	Farmers as entrepreneurs within more effective governance systems to manage public goods including human health. However, areas where no consensus was reached centred on the future shape of the system ie large/small scale, HEI/LEI, role of trade and TNCs
Were agricultural technology solutions suggested? If so, which kinds were recommended? For whom, and controlled by who?	Technology choices have social, environmental, political and economic impacts, and are politically determined. Technology choices should be based on the effectiveness of the technology or intervention at leading to the development and sustainability outcomes required.	Stressed the importance of using existing knowledge and technologies to address current problems, while investing in research to develop new technologies to improve production. Control and ownership was not discussed.	Technology should be "...appropriate to scale and conditions", more widely available and affordable, and based on indigenous systems as well as new technologies. However, areas where no consensus was reached include types of technology most relevant to developing a sustainable system eg GMOs or agro-ecological approaches

5 Proposed solutions	IAASTD 2009	Foresight 2011	UN DESA 2012
What role was agricultural technology and research expected to play in providing solutions?	The socio-economic context of research and technology was the focus of the report; research should be re-directed to address the needs of resource-poor farmers and other marginalised groups	Research recommended across broad spectrum of issues, and types of research, but the main focus was on increasing productivity across different contexts. Public concern about new technologies was acknowledged along with social and cultural considerations that may lead to different up-take of new technologies in different contexts	Research directed to the ends chosen by policies may empower small-scale farmers to innovate to meet their needs.
Where are knowledge and technologies generated?	At all levels, but specifically included local and traditional knowledges, taking an interdisciplinary approach and integrating farmer concerns	This was not specified	At all levels.
Was the relationship between analysis and recommendations consistent?	Yes: report focused consistently on development and sustainability outcomes	There was some inconsistency, especially in relation to the types of markets. The report placed 'sustainability' centrally, and argued that all policy options should remain open. However, it did not question the logic of markets and considered globalised trade to be inevitable. But, when discussing waste, it highlighted the limits what markets can achieve. There were similar mixed messages in relation to the role of consumers, and the effectiveness of behaviour-change strategies	UNDESA's approach to building consensus lead to a series of recommendations that avoided contentious issues, eg issues of power and equity were raised but not addressed, environmental sustainability considerations were prioritised issues of poverty and hunger.
Who was expected to implement the solutions?	Stakeholders include governments, NGOs, private sector, producer and consumer groups, international organisations and the scientific community, all of whom were expected	Recommendations were made for implementation at national, regional and global levels, as well as for other stakeholders such as consumers and academia	Governments expected to create an enabling policy environment, and to increase investment in the sector, but specifics were scarce

5 Proposed solutions	IAASTD 2009	Foresight 2011	UN DESA 2012
	to act according to their differentiated responsibilities		
Who was advocating the solutions?	Stressed agency at multiple levels, as was the need to enable a more bottom-up approaches to develop	Solutions advocated by governments, mostly at national levels	Agency at multiple levels was acknowledged
Were suggested solutions contextualised?	Yes.	Yes	Yes.
Was food production considered in isolation or was a multi-sectoral approach taken?	Multi-sectorally	A broad multi-sectoral approach was taken, stressing improving policy coherence across different sectors	Solutions were limited to the agricultural sector, though interactions with energy sector were highlighted.

5 Proposed solutions	World Economic Forum 2010	G20 2011	CFS 2012
What solutions were proposed, and what was not included?	Incumbent experts and institutions should identify technologies suitable for addressing specific bottlenecks in the value chain.	Not specified. The only technology directly mentioned was plant breeding. Recommended investing in adaptation and mitigation technologies, but did not specify what these might be.	Not specified. Stressed the need for small-holder sensitive investments, and involvement of all stakeholders in programme and policy design and implementation.
What sorts of agricultural systems were recommended for developing countries eg cash crops for export? Crops for local consumption? Agro-ecological approaches?	Incumbent experts and institutions should identify technologies to address specific bottlenecks / problems. Socio-economic context not explored.	Technology should increase productivity and improve markets, but no context(s) was/were discussed	Socio-economic and cultural context were highlighted in relation to nutrition, food preferences, gender issues, discrimination, though not specifically in relation to the contexts in which research and technology will be used
Were agricultural technology solutions suggested? If so, which kinds were recommended? For whom, and controlled by who?	At global level, and only in the most general terms, ie enthusiasm for 'innovation'	Called for improvements in technology transfer, but also for research that responds to the needs of farmers and involves them in research processes	Not specified
What role was agricultural technology and research expected	Little consistency between assessment of 'demand' and description of basic social 'needs'.	No. The relationship between global level food security, and access to food for vulnerable communities was confused. Assumed that strong international	Socio-economic and cultural context were highlighted in relation to nutrition, food preferences, gender issues, discrimination, though not specifically in

5 Proposed solutions	World Economic Forum 2010	G20 2011	CFS 2012
to play in providing solutions?		markets will lead to increased access to food for the poorest, but also that improving the productivity of small-scale producers will increase global food security. Recommendations limited to enhancing market functioning.	relation to the contexts in which research and technology will be used
Where are knowledge and technologies generated?	Smallholder ‘green revolution’, integrating smallholder farmers into global value chains, increasing their productivity, increasing efficiency along the chain expansion of commercial agriculture, “responsible land expansion”.	The document contained many statements about what needs to be addressed, but not how. Eg solutions concerned increasing “resilience, production, productivity and resource efficiency” and creating ‘an enabling environment for investment’. Specific solutions were the establishment of IRIWI (wheat research), launch of AMIS (ag markets), plus a forum for policy officials, launch of geo-monitoring initiative.	Many recommendations for actions, including twin-track approach ie immediate action to tackle hunger, long-term action to ensure sustainable ag production and actions to link ag investment to small-holders’ needs, address gender issues, food price volatility, increase production sustainably, plus issues of nutrition and tenure issues. A rights-based approach was recommended, and solutions focussed on improving governance, transparency, institutional capacity, rule of law.
Was the relationship between analysis and recommendations consistent?	Farmers as entrepreneurs – business model, private sector taking a lead role in all aspects including extension, research etc.	This was not specified, but the focus was primarily on global markets and international trade. The report recognised that improving smallholder productivity would give them direct access to more food	Not specified.
Who was expected to implement the solutions?	Entrepreneurs and governments should identify technologies addressing specific bottlenecks in the value chain.	This was not specified. The only technology directly mentioned was plant breeding. The report recommended investing in adaptation and mitigation	Not specified. Stressed the need for small-holder-sensitive investments, and involvement of all stakeholders in

5 Proposed solutions	World Economic Forum 2010	G20 2011	CFS 2012
		technologies, but did not specify what those might be.	programmes and policy design and implementation.
Who was advocating the solutions?	Entrepreneurs expected to identify technologies to address specific bottlenecks/problems. Socio-economic context not explored.	Technology should increase productivity and improve markets, but no context was discussed	Socio-economic and cultural contexts highlighted in relation to nutrition, food preferences, gender issues, discrimination, though not specifically in relation to research or technology use
Were suggested solutions contextualised?	At global level	The report called for improvements in technology transfer, but also for research that responds to the needs of farmers and involves them in research processes	The report called for technology transfer, local knowledge generation, and the involvement of all stakeholders in programme design and implementation
Was food production considered in isolation or was a multi-sectoral approach taken?	Little consistency between assessment of 'demand' and description of basic social 'needs'.	No. The relationship between global level food security, and access to food for vulnerable communities was confused. The report assumed strong international markets will lead to increased access to food for the poorest, but also that improving the productivity of small-scale producers will increase global food security. Outputs were limited to actions relating to market functioning.	Yes. The report took a rights-based approach linking discrimination, governance issues, rule of law, institutional capacity with hunger and food insecurity, and recommended actions to improve governance and policy coherence at multiple levels
Where are knowledge and technologies generated?	Global corporations taking the lead with governments and civil society filling in the gaps as needed	The G20 committed to 4 specific actions, but called on others (eg FAO) to undertake a wide range of other actions which the report considered necessary.	Recommendations were made for implementation at national, regional and global levels
Was the relationship between analysis and	Top down – global corporations	Solutions advocated are all at the level of G20 / UN i.e. those advocating solutions are expected to action them, though there are some calls for action by national governments	GFS “is not a legally binding instrument” p.6 Therefore it can offer recommendations and policy advice, but recommendations have to be implemented by appropriate stakeholders

5 Proposed solutions	World Economic Forum 2010	G20 2011	CFS 2012
recommendations consistent?			e.g. national governments, donor governments, CSOs
Who was expected to implement the solutions?	Minimally: 'local' was used regularly but not defined, scaling-up was called for, acting 'at scale' was recommended. But need for local decision-making and local results acknowledged.	Minimally	Yes
Who was advocating the solutions?	Mostly a single-sector approach, though acknowledging the relationship between health, education and productivity	It is considered in isolation – and only one factor affecting food production (the functioning of markets) is considered in any depth	A very broad multi-sectoral approach is taken, including consideration of legal and justice issues, labour issues etc.
Were suggested solutions contextualised?	Minimally: 'local' was used regularly but not defined; scaling up was called for, 'acting at scale' was recommended. But also need for local decision-making and local results was acknowledged.	Minimally	Yes
Was food production considered in isolation or was a multi-sectoral approach taken?	Mostly a single sector approach, though acknowledgement of the relationship between health, education and productivity	It was considered in isolation – and only one factor affecting food production (the functioning of markets) was considered in any depth	A very broad multi-sectoral approach was taken, including consideration of legal and justice issues, labour issues