

Agri-food systems innovation: Pathways to impact Workshop

Background

CSIRO and the Secretariat of Independent Science and Partnership and Council (ISPC) of the CGIAR have an ongoing collaboration to explore the nature of agri-food system innovation, the role of research within this and the way different types of innovation processes lead to impact. The purpose of this initiative is to support a wider collaborative process that helps the development and application of explanatory principles, guidance, and tools to improve the impact effectiveness of investments in agri-food system innovation.

As a starting point, a case study-backed framework has been developed that describes three modes of innovation: incremental, radical, and transformational (Figure 1, description below, and Table 1). Each of these has distinct practices, partnerships, research contributions, policy settings, and scale attributes.

Purpose of the framework

The framework provides an alternative explanation of the way agri-food system innovation and impact occurs. This could potentially open up new opportunities to tackle critical issues in agri-food innovation systems in both global and Australian agri-food sectors. However, its intent is to scaffold a wider engagement with, and co-development of solutions to these issues rather than to provide a stand-alone answer.

Purpose of the workshop

The purpose of this meeting is to open up a conversation on this topic, to draw in a wider set of perspectives, and to explore collaboration opportunities. In particular the meeting aims (i) to identify limitations and missed impact opportunities of current agri-food innovation systems; (ii) to explore the nature of frameworks and tools needed to advance innovation and impact; and (iii) to develop a road map on how these could be co-developed to best meet the needs of different stakeholder groups.

The framework

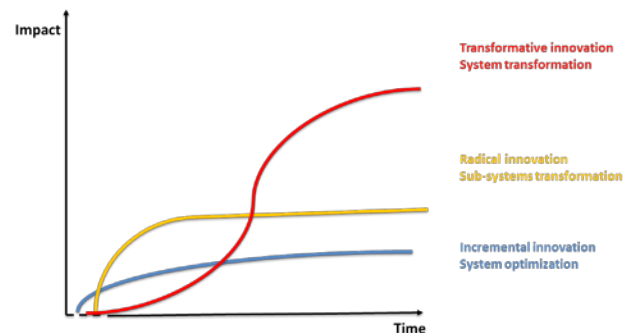


Figure 1: Modes of Innovation and impact

Incremental Innovation or systems optimisation

Key characteristics. Incremental improvement of existing products and services or incremental improvement of value chain efficiencies that deliver marginal social, economic, and environmental impact in specific production systems and value chains.

Key processes and enablers. Case studies illustrate the way research helps develop incremental improvements in existing farming systems and individual value chains. These deliver valuable local improvements to livelihoods of smallholders and profits for value chain actors. Demand-led research and collaborative action by local stakeholders are critical in defining and developing solutions. The scale of impact, however, is often restricted by the absence of policy, institutional and market systems changes and investments needed to spread and sustain these innovations

Radical innovation or sub-system transformation

Key characteristics. Technological and/or market “step changes” or discontinuities that open up new economic, social and environmental impact opportunities in a specific sub-sector or market sector and open up new opportunities for incremental innovation.

Key processes and enablers. Cases illustrate ways in which new types of products and services (animal health products, livestock insurance and novel agricultural inputs) emerging from research organizations have created step change improvements in specific sub-sectors. Mission-focused research and novel forms of public private sector partnership have provided new solutions to generic sub-sector challenges, followed by incremental innovations to improve impact effectiveness. All cases demonstrate a degree of sub-sector transformation including market disruption, collaboration between the public and private sector to create delivery and control systems, and infrastructure investment. All cases also open up new economic and other value-added opportunities, new incremental innovation opportunities in production and marketing systems, and new opportunities for the delivery of a wider range of products and services through the establishment of new delivery systems.

Transformative innovation or system transformation

Key characteristics. Deep systems changes underpinned by broad-based consensus that significantly advance the economic, social, and environmental frontiers of the agri-food sector as a whole, and that open up opportunities for new waves of radical and incremental innovation.

Key processes and enablers. Case studies illustrate far-reaching types of innovation with pervasive implications for the entire agri-food sector. These cases are not demand driven *per se*, but emerge from a broad-based consensus on the need to pursue new directions or take advantage of new platform technologies. In some cases, the combination of policy-push, technical and institutional responses, and innovation has extended the frontiers of both profitability and sustainability of the agri-food sector as a whole. The high-level stakeholder and political alignment and the organizational arrangements put in place to advance this transformation have also been used to address other sustainability challenges, notably fertilizer and pesticide run-off. Other more nascent transformative cases associated with advances in information technology suggest that a key bottleneck is the lack of mechanisms to convene stakeholders to achieve political alignment needed to create a “joined up” approach to facilitate the economic, social and environmental step changes that new technology promises.

Observations across the case studies

1. Much of the received wisdom on innovation good practice and its links to impact is evidenced in the case studies: i) client orientation and involvement in innovation processes; ii) various forms of partnerships and alliances and the importance of both public and private investment; and iii) the importance of science, technology and research as both initiators and enablers of innovation.
2. However the case studies also suggest that the overriding ingredient in innovation processes that have pervasive impact and lead to transformational change do not relate to the fine-grained arrangements involved in the innovation processes *per se* (although these are critical implementation strategies). Rather the main ingredient is macro level alignment of public policy, private sector, and often civil society objectives. This is particularly important where larger societal issues such as environmental protection, health, and nutritional and food security are at stake.
3. Despite the critical role played by the private sector, purposeful and proactive public investment is evident in the radical and transformative modes of innovation. This involves responding to market failures through, for example, investing in research that creates opportunities for the private sector through commercialization. It also involves, however, solving system failures through, for example, investment in the creation of a mechanism to bring industry, civil society, and research players together to tackle systemic challenges.
4. The three modes of innovation discussed all have a value in progressing equitable and sustainable economic growth, albeit with different scales of impact. These modes also highlight the way clusters of policies, practices and stakeholder interests can lock agriculture into incremental innovation and system optimization at a time when step changes are needed: although the precise nature of these lock-in needs further exploration. One manifestation of this is that public (but also industry body) investments have given primacy to demand-led, bottom-up processes and short-term impacts at the farm scale, thus skewing the allocation of resources towards this local optimization route at the expense of investment in transformative changes.

Tables 1 summaries the critical features of the modes of innovation described by the framework.

Table 1: Typologies of innovation modes

	Incremental innovation	Radical innovation	Transformational innovation	Paradigm innovation
Focus	Systems optimization	Sub-system transformation	System transformation	Systems replacement
Key features	Continuous improvement of existing products and services in current production systems and value chains	Technological and/or market “step jumps” or discontinuities that enable the creation of new products or service but restricted to a sub-sector or existing market segment	Deep systems changes that significantly affect the agricultural sector as a whole enabling the creation of new classes of products and services	Paradigm changes that potentially affect all sectors of the economy
Impact scope	Incrementally improves social, economic and environmental impact within system limits	Significantly expands economic, social and environmental impact in a specific sub-sector or existing market segment	Unlocks new economic, social and environmental impact possibilities across the agricultural sector	Reframed global limits to growth
Trajectory	Creates understanding of technological and system’s limits that need to be addressed	Creates opportunities for next wave of incremental innovation in agricultural sub-sectors or market segments	Creates opportunities for next wave of radical and incremental innovation in the agricultural sector	Creates opportunities for transformative, radical and incremental innovation in all economic sectors
Defining processes and practices	Demand-led priorities setting and user led co-creation of solutions informed by research coupled with participatory processes and governance	Alignment of business and policy incentives and agendas allows commercialization of technological breakthroughs addressing defined problems and opportunities	Public, private and civil society’s alignment around new directions to tackle critical societal issues involving uncertainty and complexity	Global uncertainty. The search for unimagined futures
Policy framing	Science and technology	Sub-sector innovation policy	National Systems of Innovation	
Timeframes / phasing	Continuous	Discontinuous events	Periodic tipping points	Epochs with shortening cycles