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INNOVATION PLATFORMS: EXPERIENCES WITH THEIR INSTITUTIONAL EMBEDDING IN AGRICULTURAL RESEARCH FOR DEVELOPMENT

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SUMMARY

Innovation Platforms (IPs) are seen as a promising vehicle to foster a paradigm shift in agricultural research for development (AR4D). By facilitating interaction, negotiation and collective action between farmers, researchers and other stakeholders, IPs can contribute to more integrated, systemic innovation that is essential for achieving agricultural development impacts. However, successful implementation of IPs requires institutional change within AR4D establishments. The objective of this paper is to reflect on the implementation and institutionalisation of IPs in present AR4D programmes. We use experiences from sub-Saharan Africa to demonstrate how the adoption and adaptation of IPs creates both opportunities and challenges that influence platform performance and impact. Niche-regime theory is used to understand challenges, and anticipate on how to deal with them. A key concern is whether IPs in AR4D challenge or reinforce existing technology-oriented agricultural innovation paradigms. For example, stakeholder representation, facilitation and institutional embedding determine to a large extent whether the IP can strengthen systemic capacity to innovate that can lead to real paradigm change, or are merely 'old wine in new bottles' and a continuation of 'business as usual'. Institutional embedding of IPs and – more broadly – the transition from technology-oriented to system-oriented AR4D approaches requires structural changes in organisational mandates, incentives, procedures and funding, as well as investments in exchange of experiences, learning and capacity development.

INTRODUCTION

IPs are increasingly seen as a promising vehicle for agricultural innovation in developing countries (Adekunle and Fatunbi, 2012; Kilelu *et al.*, 2013; Ngwenya and Hagmann, 2011; Pamuk *et al.*, 2014; Swaans *et al.*, 2014; van Mierlo and Totin, 2014; van Paassen *et al.*, 2014). In the field of AR4D, IPs form an important element towards

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more structural and long-term collaboration and engagement between stakeholders in the agricultural sector that has been indicated as essential to achieve development impacts (Adekunle and Fatunbi, 2012; Sumberg *et al.*, 2013a). IPs build on experiences with earlier well-known multi-stakeholder approaches such as Farmer Field Schools (Kenmore *et al.*, 1987; Pontius, 2002), Participatory Research (Kerr *et al.*, 2007), Learning Alliances (Lundy *et al.*, 2005; Mvumi *et al.*, 2009), Local Agricultural Research Committees (Hellin *et al.*, 2008) and Natural Resource Management Platforms (Röling, 1994).

IP aim to strengthen AR4D – and the agricultural innovation systems in which AR4D is embedded – by facilitating interaction and collaboration in networks of farmers, extension officers, policymakers, researchers and other stakeholders in the agricultural system, and by providing space for experimentation, learning and negotiation (Klerkx *et al.*, 2013; Ngwenya and Hagmann, 2011; Swaans *et al.*, 2014). Continuous engagement of stakeholders in describing and explaining problems, and exploring innovations to address these problems is seen as essential for three reasons. First, different stakeholder groups can provide various insights about the biophysical, technological and institutional dimensions of the problem, and what type of innovations are technically feasible, economically viable and social-culturally and politically acceptable (Schut *et al.*, 2014c). Second, stakeholder groups become aware of their fundamental interdependencies and the need for concerted action to overcome their constraints and reach their objectives (Leeuwis, 2000; Messely *et al.*, 2013). Third, stakeholder groups are more likely to support specific solutions when they have been part of the decision-making process (Faysse, 2006; Neef and Neubert, 2011). In facilitating interaction and engagement, IPs can foster systemic 'capacity to innovate' of stakeholders to: (1) continuously identify and prioritise problems and opportunities in the dynamic environment that they are in, (2) take risk and experiment with socio-technical options and assess the trade-off from these options, (3) mobilise resources and form support coalitions around the promising options, (4) link with others to share information and knowledge in support of change processes and (5) collaborate and coordinate with others with the aim of achieving concerted and collective action (Leeuwis *et al.*, 2014).

Recent studies on IPs demonstrate their potential in terms of realising coherent agricultural research, development and policy strategies (e.g. Ayele *et al.*, 2012; Kilelu *et al.*, 2013; Schut *et al.*, 2014a; Swaans *et al.*, 2014). However, experiences also show that IPs' performance and impact depend on many variables. For example, the quality of platform organisation, stakeholder representation, facilitation and institutional embedding determine to a large extent whether platforms can lead to real change or innovation (Boogaard *et al.*, 2013; Nederlof *et al.*, 2011; Ngwenya and Hagmann, 2011). Despite IP rhetoric, there may be an institutional context which leads to continuation of 'business as usual' practices, following an approach in which science develops and tests technologies that are then transferred to end users (Cullen *et al.*, 2014; Friederichsen *et al.*, 2013; Sumberg *et al.*, 2013b). Furthermore, several authors have found that IP-type approaches struggle to be adequately resourced in systems that traditionally adhere to linear, top-down approaches to innovation (Kristjanson *et al.*, 2009; Nettle *et al.*, 2013). With a new 'wave' of multi-stakeholder approaches for enhancing systemic capacity to innovation in international AR4D, there is a need to reflect on the IP implementation and institutional embedding.

The objective of this paper is to identify opportunities and challenges for IPs in terms of their institutional embedding in AR4D systems and fostering systemic capacity for agricultural innovation. We study this in the context of international AR4D, which efficiency in terms of fostering innovation using participatory and collaborative approaches has been object of reform and study over time (e.g. Clark *et al.*, 2011; De Janvry and Kassam, 2004; Hall *et al.*, 2003; Hellin *et al.*, 2008; Horton, 1998; Horton and Mackay, 2003; Santamaría Guerra, 2003; Watts *et al.*, 2008). Several authors have denoted a history of discontinuity in terms of applying and institutionalising participatory approaches (Kristjanson *et al.*, 2009; Thiele *et al.*, 2001). As several international AR4D programmes have recently (re-) adopted IPs as an important vehicle for multi-stakeholder engagement and to achieve impact, studying their institutional embedding is key. The objective of this paper is not to critique the IP approach or the programmes and people that are implementing them. On the contrary, we take a constructive approach to analyse the dynamics of IPs in the AR4D context in order to provide recommendations to enhance IP performance, their structural embedding in international AR4D, and their contribution to achieving development impact.

CONCEPTUAL FRAMEWORK

IPs to support strategic niche management for system innovation

Niche-regime theory based on the multi-level perspective on system innovation (Geels, 2004) is used to analyse how the functioning of IPs is constrained or enabled by the dominant AR4D context. IPs can play a key role in facilitating so-called system innovation in agriculture, which has been found essential to solve the complex agricultural problems (Elzen *et al.*, 2012a; Hounkonnou *et al.*, 2012; Kilelu *et al.*, 2013; Schut *et al.*, 2015a). Such system innovation requires fundamental restructuring of production systems, supply-chains, policies, management, monitoring and evaluation (M&E) and decision-making processes (Hall, 2005; Roep *et al.*, 2003; van Mierlo and Totin, 2014). Previous experiences from the agricultural sector demonstrate how, through processes of formation and re-formation (i.e. institutionalisation), actors and organisations tend to become locked into static 'regimes' of technologies, policies, routines, protocols, norms, values, incentives structures and regulations (Elzen *et al.*, 2012a; Hinrichs, 2014; Sumberg *et al.*, 2013b; Vanloqueren and Baret, 2009). Although regimes are stable, they can change over time. Dissatisfaction of regime functioning or outside pressure creates opportunities for so-called 'niches' in which alternative practices are developed and tested, to change regime configuration. In niches, actors experiment with and organise around particular ideals, interests and, purposes and, need to engage with the regime to negotiate durable change (Elzen *et al.*, 2012b; Klerkx *et al.*, 2010). To support niches in this effort, approaches like 'strategic niche management' are aimed at shielding off niches from prevailing regime selection pressures and tensions, so that they get a chance to mature and contribute to regime reconfiguration (Loorbach and Rotmans, 2010; Schot, 2008). However, incumbent regime configurations have path-dependencies, sunk investments and a certain institutional logic, which is not easy to durably change (Fuenfschilling and Truffer, 2013). As a consequence, niche innovations remain prone to being translated, compromised and renegotiated in order to 'fit' the incumbent regime's needs and requirements (Elzen *et al.*, 2012b; Smink *et al.*, 2015; Smith, 2007). IPs can be considered as places where niches can develop, and where niche and regime players meet, interact and negotiate systemic change.

IP as a strategic niche to reform the AR4D system

As indicated in the previous section, IPs can contribute to strategic niche management, but they are also a strategic niche in themselves as they can be considered an institutional system innovation. Acknowledging the inherent complexity of agricultural problems and the need for system innovation, collaborative approaches such as IPs have been proposed to foster a paradigm shift from technology-oriented to systems-oriented AR4D (Hounkonnou *et al.*, 2012; Moschitz *et al.*, 2015; Sherwood *et al.*, 2012). Based on a meta-review, Klerkx *et al.* (2012) identified four evolving approaches to agricultural innovation (1) the transfer of technology approach that reflects the idea that researchers develop knowledge and technologies, which are then transferred 'top-down' by extensionists to farmers or other end-users (e.g. Rogers, 1962), (2) the farming systems approach that has more attention for the context-specific social-cultural, economic and agro-ecological drivers that influence the performance of agricultural innovations at the level of the individual field, the farm, or a collection of farms (e.g. Altieri, 1984; Biggs, 1995; Giller, 2013), (3) the agricultural knowledge and information systems (AKIS) approach that embodies a gradual shift from top-down to bottom-up approaches to agricultural innovation (e.g. Engel, 1995), and (4) the agricultural innovations systems (AIS) approach, that has more attention for the systemic institutional and political dimensions of innovation processes (e.g. Hounkonnou *et al.*, 2012; Leeuwis, 2000).

The above-described paradigm shift is rooted in several debates on the organisation and role of science, for example about different 'modes' of knowledge production (Gibbons, 1994; Nowotny *et al.*, 2003), research 'for' development versus research 'in' development approaches (Coe *et al.*, 2014), expert-led development versus people-led development (Sherwood, 2009), or science-centric innovation systems towards innovation systems that support systemic and emergent multi-stakeholder processes (Nettle *et al.*, 2013). Although differences exist between these debates, they all reflect a move away from approaches to agricultural innovation where the development and transfer of technologies or technical solutions by researchers and experts, and the adoption by farmers is central (technology oriented); towards approaches where processes of integrated problem analysis, participatory priority setting, designing and implementing of technological and socio-organisational solutions by stakeholders

Table 1. Features of technology-oriented versus systems-oriented approaches to agricultural innovation (based on Gibbons, 1994; Hall, 2005; Klerkx *et al.*, 2012; Nowotny *et al.*, 2003; Sherwood, 2009; World Bank, 2006).

Features	Technology-oriented approaches to agricultural innovation	Systems-oriented approaches to agricultural innovation
Conception of agricultural innovation	The successful development, transfer, adoption and diffusion of techniques and technologies	A process of technological and socio-organisational/institutional changes
Key objective	Technology transfer and dissemination to increase agricultural productivity	Enhance systems capacity to generate and respond to change
(Disciplinary) focus	Inter- and multi-disciplinary –single component solutions developed by researchers; focus on productivity increase	Trans-disciplinary – integrated solutions produced through interactions between researchers and other stakeholders; focus on enhancing innovation capacity in agricultural system
Institutional embedding and accountability	Predetermined projects focussed on rapid technological progress; preoccupied with meeting criteria, outputs and deliverables	Flexible and adaptive processes resulting in more robust agricultural systems; preoccupied with relevance, outcomes and impact
Nature of knowledge (production)	Knowledge and technologies result from research and are generalisable and scalable	Knowledge and technologies result from stakeholder interactions and learning and are context specific and dependent on locality
Role of researchers	Researchers produce authoritative, objective and value-free knowledge and technologies	Researchers operate in an action research mode, and collaborate with other stakeholders to enhance innovation capacity in the agricultural system
Role of farmers and other stakeholders	Passive subjects: adopters/ end-user of technologies	Active subjects: entrepreneurs who question, learn and teach, find solutions
Intervention and learning methods	Training and teaching; demonstrations; controlled, research-led experiments	Dialogue and negotiation; discovery-based activities; stakeholder experimentation; reflexion and joint learning

(including researchers) are central (systems oriented) (Table 1) (Klerkx and Leeuwis, 2009; Neef and Neubert, 2011).

Despite various attempts to make them more integrated, participatory and demand-driven (e.g. Devaux *et al.*, 2010; Kristjanson *et al.*, 2009), many AR4D systems still very much reflect the technology-oriented approach to agricultural innovation (e.g. Biggs, 2008; Rivera and Sulaiman, 2009; Schut *et al.*, 2014b; 2015b; Sumberg *et al.*, 2013a; 2013b). This incumbent, technology-oriented AR4D system can hence be considered to be (part of) a regime (Minh *et al.*, 2014). The regime configuration determines to a large extent what types of innovations are perceived to be needed (e.g. what are considered to be 'good agricultural practices'), and how the science system is supposed to support innovations (Lamine, 2011; Li *et al.*, 2013; Minh *et al.*, 2014; Vanloqueren and Baret, 2009).

Through their focus on understanding systemic constraints and opportunities for innovation, developing a joint vision for collective agency and action, and mobilising allies and resources, IPs are believed to provide an important contribution to a transformation of incumbent technology-oriented AR4D regimes (van Paassen *et al.*, 2014).

RESEARCH METHODS

Study context

Data for this study were gathered in two AR4D programmes in Africa. The first is the IP programme championed by the Forum for Agricultural Research in Africa (FARA), and implemented under the Sub-Saharan Africa Challenge Programme (SSA-CP) and the Dissemination of New Agricultural Technologies for Africa (DONATA) project. The second is the CGIAR Research Program on Integrated Systems for the Humid Tropics (Humidtropics) that has adopted the platform approach for achieving multi-stakeholder engagement, and realising its R4D outcomes across three continents. The SSA-CP was implemented in eight countries. The programme's Integrated AR4D approach was tested through 32 IPs. The objective of these IPs was mainly to create, or link farmers to, niche markets in existing value chains (CORAF/ WECARD, 2012). Within Humidtropics, platforms form the core of the programme's strategy to stimulate multi-stakeholder collaboration towards the realisation of agricultural development outcomes. The programme's projected timeline of 15 years reveals the central role of long-term partnerships in fostering innovation in the agricultural system. In Humidtropics, two types of IPs are distinguished. IPs at the more local, 'field site' level, are expected to identify, and experiment with, a coherent set of entry points for agricultural innovation. IPs at the so-called 'action site' level (which is often, but not necessarily the provincial or national level), are expected to facilitate the removal of constraints for the scaling of technological and institutional innovations[1]. Both types of IPs are composed of different stakeholder groups, including farmers (organisations), donors and development organisations, private sector, government, researchers and media.

Methods of data collection and sampling

Data were collected from primary and secondary sources (Table 2). Primary data sources are participatory observations, semi-structured interviews and surveys. Participatory observation is a purposeful and systematic way of observing an interaction or phenomenon as it takes place (Kumar, 2005). Between July 2014 and January 2015, a total of 20 Humidtropics IP events were attended in Uganda, Burundi, Rwanda and DR Congo. These events do not only concern the actual platform meetings, but also preparatory events, field visits and reflection meetings. Observations were documented in written jottings and field notes. For the semi-structured interviews, a topic list was prepared and fine-tuned for each interview depending on the specific role of the respondent in the case. It was decided to conduct key-informant interviews with facilitators and researchers that worked with, or had

[1] In Humidtropics, these higher level platforms are referred to as 'Research for Development Platforms'.

Table 2. Methods of data collection, sampling method and size and type of information gathered.

Method	Sampling method	Sample size	Type of information	AR4D programme
Participatory observations	Purposive sampling	20	IP facilitation and activities in AR4D programme	Humidtropics
Semi-structured interviews	Purposive and snowball sampling	6	Experiences with IP in AR4D context	SSA-CP/ DONATA and Humidtropics
Surveys	Purposive sampling	19	Perceptions on agricultural innovation and IP	Humidtropics
Secondary data analysis	Purposive sampling	N/A	Analysis of IP case studies, IP agendas, minutes.	SSA-CP/ DONATA and Humidtropics

studied, IPs in an AR4D context. Respondents were purposefully selected, or based on snowball sampling where interviewed key-informants identify other people that could be of relevance to the study (Russell Bernard, 2006). In total, six key informants were interviewed, all with considerable experience in analysing IPs across different programmes and countries. Interviews typically took one hour and were recorded and transcribed. Furthermore, a capacity development workshop for Humidtropics staff and IP facilitators was organised in April 2014 in Kenya. Preceding the workshop, a survey was conducted that provided insight in the perceptions of the 19 participants on agricultural innovation and the role of IPs. Secondary data sources are previously collected and documented data (Kumar, 2005). Examples of secondary data used in this study are, amongst others, agendas, announcements, minutes and other written reports of IP meetings, as well as M&E reports and scientific papers that contain empirical data gathered by other researchers. Furthermore, we analysed around 20 IP case studies published in Nederlof and Pyburn (2012) and Nederlof *et al.* (2011).

Data analysis

Qualitative descriptive analysis of observations, interviews and secondary data provided insights into the different opportunities and constraints for IPs in fostering a paradigm shift from technology-oriented to systems-oriented approaches to agricultural innovation. The features presented in Table 1 form the outline of how we present our empirical data in the next section. For reasons of confidentiality, quotes and statements made by individual interview respondents were anonymised. Quantitative analysis of the surveys was done using Microsoft Excel® software. Survey responses were coded and mapped against four perspectives on agricultural innovation (technology transfer, farming systems, AKIS and AIS) identified by Klerkx *et al.* (2012). The authors have performed moderate editing of interview quotes and questionnaire responses to enhance readability.

OPPORTUNITIES AND CHALLENGES FOR IPS IN AR4D PROGRAMMES

IPs and changing definitions of agricultural innovation

Interviews with key-informants and observations demonstrated that the majority of platform facilitators and participants are aware of the advantages of IPs. Frequently mentioned advantages include working together to align objectives of stakeholders and facilitating interactions and collaboration across different levels. Of the surveyed platform facilitators, 61% adopt a systems-oriented definition to agricultural innovation. For these respondents, the facilitation of (farmer) participatory research and learning, and processes of technological and non-technological change are more closely related to agricultural innovation than the development, transfer, adaptation and adaptation of technologies for farmers, which was preferred by remaining 39% of the respondents (Table 3).

When looking at the practice of IPs, some interviewees express that IPs are sometimes 'old wine in a new bottle'. They explain that in some occasions, the IP offers a 'brand name, but practically the only thing that they do is having extension agents and scientists rolling out their ideas upon farmers' heads'. This 'corruption of the term' eventually damages the reputation of the IP approach, and consequently, its ability to achieve its potential to foster a paradigm shift in agricultural innovation. Participatory priority setting exercises were organised with the Humidtropics IPs to identify entry points for agricultural innovation. When comparing the identified entry points with the actual (field) R4D activities executed, overlap and gaps can be identified. In some cases, entry points that were identified by the IPs have not been followed up, whereas in other cases, new entry points have been included in the R4D agenda. Interviews revealed that this is mainly due to existing project commitments and funding frameworks, as well as to personal and organisational mandates and preferences to work on certain R4D themes in specific regions. These commitments, mandates and preferences did not always match the IP needs and interests.

Key objectives for working with IPs

Survey results reveal that enhancing capacity to generate and respond to change forms the key objective for working with IPs (61%). A very small proportion of facilitators believe the key objective is purely technology oriented, namely to foster transfer, diffusion and adoption of technology (6%) (Table 3). Project documentation and other secondary data reveal that under the SSA-CP, IPs for technology adoption (IPTAs) were promoted under a continental platform for technology dissemination. IPTAs are organised around: 'A common commodity and analyse gaps in the commodity value chain to define the IPTA's specific interventions. They follow the concept that effective agricultural technology dissemination – the adoption, use, uptake or commercialisation of existing knowledge – calls for understanding of farming systems through strong linkages and active participation among a range of actors' (FARA, 2012). According to our interviewees, technology transfer and adoption at farm level form indeed an important objective of many IPs. They added that there is often limited attention for enhancing capacity at the systems

Table 3. Results of survey on conducted among 19 IP facilitators mapped against four perspectives on agricultural innovation.

	Approach to innovation			
	Technology-oriented approach to agricultural innovation		Systems-oriented approach to agricultural innovation	
Features	Technology-oriented (e.g. linear transfer of technology approach)	More technology-oriented than systems-oriented (e.g. farming systems approach)	More systems-oriented than technology-oriented (e.g. agricultural knowledge and information systems approach)	Systems-oriented approach (agricultural innovation systems approach)
Conception of agricultural innovation	Successful technology development, transfer, adoption and diffusion 11%	Development and adaptation of technologies for farmers 28%	Facilitating (farmer) participatory research and learning 28%	A process of technological and non-technological changes 33%
Key objective of working with IP	Transfer, diffusion and adoption of technology 6%	Contextualise agricultural research and technology 17%	Local capacity building, farmer empowerment 17%	Enhance systems capacity to generate and respond to change 61%
(Disciplinary) focus	Enhance efficiency of technology transfer 6%	Develop locally adapted knowledge and technology 28%	Joint problem solving and learning across the value chain 56%	Integrated solutions to agricultural problems 11%
IP effectiveness, institutional embedding and accountability	Rapid technological progress 11%	Contextualised technology development and use 0%	Integration of different types of knowledge 50%	Institutional change processes 39%
Nature of knowledge production	High quality technological progress and extension services 5%	Farmer involvement in contextualised technology development 21%	Community-based participatory research, information sharing and learning 47%	Addressing structural power inequalities between stake-holders across different levels 26%

Table 3. Continued

Features	Approach to innovation			
	Technology-oriented approach to agricultural innovation		Systems-oriented approach to agricultural innovation	
	Technology-oriented (e.g. linear transfer of technology approach)	More technology-oriented than systems-oriented (e.g. farming systems approach)	More systems-oriented than technology-oriented (e.g. agricultural knowledge and information systems approach)	Systems-oriented approach (agricultural innovation systems approach)
Roles of researchers	Develop knowledge and technologies	Agricultural experts	Facilitators of learning and capacity building	Enhance innovation capacity in the agricultural system
	33%	11%	28%	28%
Roles of farmers	Adopters/ end-user of technologies	Adopters of technologies and source of information	Experimenters and experts	Entrepreneurs
	17%	33%	33%	17%
Intervention and learning methods	Extension disseminates technology to facilitate adoption	Farmer consultation to inform research	Facilitation of joint learning through participatory research	Multi-stakeholder platforms
	0%	17%	22%	61%
	11%	19%	35%	35%
	30%		70%	

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level to continuously identify, analyse and solve technological and non-technological agricultural constraints. We observed that a large share of the current Humidtropics IP activities focus on (participatory) testing and adaptation of technologies (e.g. intercropping) at local level. Within these activities, there is attention for the non-technological dimension of agricultural innovation such as nutrition and gender. So far, attention for policy and markets is less reflected in the R4D activities, which, to a degree, can be explained by disciplinary background and professional expertise of researches in the platforms.

IP focus and disciplinary approaches to agricultural innovation

Of the surveyed IP facilitators, 56% is of the opinion that IPs should focus on stimulating joint problem solving and learning across particular value chains (Table 3). This is particularly true in the IPs managed by FARA in SSA-CP and in DONATA. Although an IP is not necessarily value chain bound, interviewees mentioned that a crop or commodity focus forms a good entry point for bringing together interrelated stakeholders and enhance collaboration for collective action. In IPs where the entry points are open, a broad variety of topics and interests emerge, running the risk that there is too little focus and common ground for collective action. Interviewees stressed that the (crop or commodity) focus of the organisation initiating or supporting the IP can determine or steer the platform focus and selection of entry points. Humidtropics IPs have been initiated by international agricultural research centres that form part of the CGIAR. The IPs are facilitated by representatives from the national agricultural research system (NARS), universities or national NGOs. Many of the platform facilitators have a natural science background (e.g. in breeding, agronomy, soil science), and generally did not receive specific training in facilitating interactive, multi-stakeholder processes.

Entry points identified by IPs may not always align with existing organisational mandates and expertise available within the (research) organisations represented in the platforms. We observe that there is limited capacity to respond to constraints that are of institutional nature and cut across commodities or value chains. Domains such as agricultural education, gender, nutrition, policies, markets and multi-stakeholder processes are historically less strongly represented in the AR4D system than, for example, agronomy, breeding and economics. To fill such gaps, new partnerships have been established and the proportion of R4D actors with expertise in these institutional domains is slowly increasing. In Uganda, for example, one of the IPs partnered with a Tanzanian research organisation specialised on vegetables to cater for the specific needs of the IP.

IPs' effectiveness, institutional embedding and accountability

According to the majority of the surveyed facilitators, effective IPs support the integration of different types of knowledge (50%) or contribute to institutional change processes (39%) (Table 3). On how to reach these objectives, different visions exist. One of the interviewees explained how an IP can be a short-term project which is dismantled after achieving its objective. Actors with a clear agenda can be part of an IP for longer or shorter periods of time. Another respondent explained further that: 'Sometimes we have the government come in for about three or four years, expecting to get a result. In the same vein we often have powerful actors, NGOs, researchers and private organisations, pushing a particular agenda for a period of time under the heading of the IP'. An interviewee with a different vision mentioned that: 'Although IPs can achieve results within the first years, this is not always feasible. Furthermore, such results may not transcend to real innovation, which also needs institutional and individual behavioural and attitudinal change, and generally that requires more time.' Interviewees relate platform effectiveness to the design of the platform process: '[W]hat we see [. . .] is a predefinition [approach] that comes from either researchers or donors'. This way of working undermines the legitimacy and mandate of the IP in setting and driving the R4D agenda. We have observed that engaging with existing research and development projects was proposed to IPs as a strategy to stimulate fast results and concrete activities that could stimulate platform learning. In several of these projects, the scope, objectives and activities did not align well with the IP's priorities. Moreover, the detailed log-frames and predetermined M&E frameworks do not always align well with key IP principles such as responding to (changing) stakeholder needs and interests. Based on our experiences, we conclude that several of these proposed projects were never implemented in collaboration with the IP.

In Humidtropics, modest, platform-led innovation funds have been created, intended to function as an incubator for activities that match platform priorities. These platform funds seem to be effective in terms of filling gaps of working on activities that IP members do not have expertise, mandate or resources for. For example, these funds are being used to support livestock R4D activities in Burundi where no other livestock (research) institute or project was able to respond to the IP demands. The availability of platform-led innovation funds should stimulate – and not reduce – the willingness of organisations represented in the IP to invest their own financial, human or other resources. Similarly, using the platform-led innovation funds to pay per diems to IP members may (negatively) affect ownership and representation, although this requires deliberation.

M&E frameworks that capture platform performance and learning processes are being developed, tested and implemented with a small number of the Humidtropics platforms. Several interviewees mentioned that the type of M&E framework used depends on the AR4D organisation supporting the IPs, as well as on the donor demands and the projects that are supposed to support IP activities. In Humidtropics, for example, quantifiable outputs related to gender need to be specified for all R4D activities, which is a priority for many donors. Although surveyed IP facilitators generally have a long-term focus on fostering institutional change processes (Table 3), we observed that meeting (annual) internal criteria for time, financial and quality management and deliverables influence priority setting towards demonstrating rapid progress and impact. Platform facilitators spend a lot of their time and energy on meeting these criteria, which may be at the expense of their attention for the IP process and coherence of platform activities. Pressure for expected annual deliverables may influence the orientation of the IP towards 'low hanging fruits' rather than dealing with fostering more fundamental and long-term institutional innovation.

Nature of knowledge produced in IPs: scalability versus contextualisation

Secondary data reveals that the performance of IPs often depends on the unique dynamics of the platform learning (process), as well as on the specific socio-economic and agro-ecological context of the identified problem (content) that the platform seeks to address. The impact of the IP is as much a result of the quality of the multi-stakeholder process (jointly identifying constraints, sharing information and learning) as well as it is a result of the performance or competitiveness of the actual innovations the platform produces. According to our interviewees, this has implications for the thinking about the generalizability and scalability of results that emerge from IPs. One of the interviewees stressed that many innovative practices are indigenous and need to be adapted and re-interpreted in order to benefit stakeholders in other contexts. A key objective of Humidtropics IPs is that innovations developed through IPs should demonstrate value-addition to existing situations and approaches, and should have built-in mechanisms for going to scale. Initial experiences show that R4D activities in IPs focus on demonstrating, or diffusing existing technologies (e.g. intercropping techniques, fertilizer applications, spacing of crops) rather than exploring 'out-of-the-box' R4D and innovation pathways. Furthermore, surveyed IP facilitators emphasise that community-based participatory research, information sharing and learning (47%) are key success factors for agricultural innovation (Table 3). Linking these community-based innovations to scaling actors such as development partners and high-level policymakers across different levels seems to receive lower emphasis, as these stakeholder groups are represented less strongly in local and national IPs in the countries where data for this study were collected. This could result in challenges for up- and outscaling of innovations that were developed through the IPs.

Roles of researchers and other stakeholders in IPs

Several of the interviewed key-informants mentioned that the traditional assumption that 'experts know it all' is only challenged to a limited extent in current IP practice. According to our respondents, this is strengthened by the fact that the majority of IPs are being initiated by (international) research organisations. Observations and interviews confirm that not only researchers, but also other stakeholders (e.g. policymakers, farmers, NGOs and donors) seem to be locked into existing division of roles and mutual dependencies and expectations. One of the causes mentioned was a lack of attention for addressing structural power inequalities between stakeholders, integration of expert and lay competences, and equal interaction and collaboration. Another key principle is that the platform can stimulate ongoing negotiation and discussion between multiple stakeholder groups, rather than reinforce a situation in which researchers develop technologies and knowledge, that extension and development partners transfer and communicate to end users (farmers). The surveys showed that 33% of the facilitators perceived the main role of researchers to be to develop technologies and knowledge. However, facilitation of learning and capacity building (28%), and enhancing innovation capacity in the agricultural system (28%) were also recognised to be important roles for researchers. A crucial challenge in this respect is how researchers see their role in a wider sense at the platform, beyond the specific disciplinary or thematic expertise that they bring to the table. Farmers were mainly seen as adopters of technologies and source of information or as experimenters and experts (both 33%) (Table 3).

Intervention and learning methods in IPs

Of the surveyed facilitators, 61% see IPs as the most effective approach to foster agricultural innovation. More traditional intervention approaches such as farmer consultation to inform research (17%) and extension-led technology transfer (0%) are seen as less effective (Table 3). IP literature sketches an approach that uses interactive methods that can foster dialogue, learning and negotiation between stakeholders with different needs and interests to achieve collective action and impact. However, the analysis of case studies, interviews and observations demonstrate that in many IPs traditional methods such as field days, training of trainers, demonstration plots and research-led experiments dominate. Documented IP cases show considerably few examples of methods that stimulate farmer-led innovation, (reflexive) monitoring of platform dynamics, or revealing and addressing power inequalities between different groups of stakeholders.

ANALYSIS AND DISCUSSION

Despite the intent and potential of IPs to foster a transition from technology-oriented to more systems-oriented approaches to agricultural innovation, practical experiences show the challenges IPs face to live up to this expectation. In order to reflect on institutional embedding of the IP approach in AR4D and to explore strategies that can strengthen the contribution of IPs to creating systemic capacity to innovate and achieve development impact, we analyse and discuss: (1) the early observations of transformation of IPs, (2) how niche-regime interactions can explain these transformation, and (3) what strategies can stimulate the progressive alignment of IPs towards systemic approaches to innovation and their institutional embedding in AR4D structures.

Early observations of transformation of IPs

Our data show first signs of transformation of IPs, some of which are positive, and others are questionable for achieving the desired paradigm shift towards a systemic perspective on agricultural innovation. Examples of positive transformations include more attention for capturing learning, both within and between IPs in terms of content and process. Documenting platform processes is important for understanding the specific conditions and issues that influence platform performance. The creation of platform-led innovation funds that can function as an incubator to work on platform priorities is innovative and can strengthen the position of platforms as independent and self-organised entities. However, the challenge here is the usually low level of actual and continuous investment and resources channelled towards IPs by AR4D programmes (Kristjanson *et al.*, 2009). Having IPs at both the local level and national level (such as in Humidtropics) can create a more conducive environment for innovation and can ensure that institutional challenges that cut across sectors, value chains, or specific localities are being addressed, including working on achieving better and continuous resourcing of IPs. Such cross cutting work is key to embedding new approaches as concluded by Minh *et al.* (2014). Understanding needs and challenges of stakeholders across different levels, and developing regional strategies that address these in a coherent way has been earlier noted as a critical success factor for agricultural innovation (De Janvry and Kassam, 2004; Giller *et al.*, 2008; Schut *et al.*, 2015a). Our findings indicate that structural attention for capacity development of IP facilitators can foster thinking about more systems-oriented approaches to agricultural innovation. Stand-alone workshops need to be complemented by structural adjustments of curricula of vocational and higher education institutes that train current and future AR4D professionals (Devaux *et al.*, 2009; Donnet *et al.*, 2012; Pant, 2012; Struik *et al.*, 2014). Another positive experience is that, in the Humidtropics site in Central Africa, platform-related R4D activities are funded through a donor project that provides a high degree of freedom and flexibility to respond to stakeholder demands.

However, we have also observed that stakeholder demands are often strategically altered to fit the objectives of existing, predefined technology-transfer projects. Trying to support demand-driven, stakeholder-led innovation processes through technology-transfer projects led by researchers and extension officers is causing challenges. The specific objectives, time-lines, funding structures and donor preferences of these technology-transfer projects often do not correspond with the demands and needs of stakeholders on the ground, as was also found in other studies (Botha *et al.*, 2014; Klerkx and Leeuwis, 2008; Roux *et al.*, 2010). The survey revealed that farmers continue to be seen as end-users of innovation, rather than as capable innovators who, in collaboration with researchers and other stakeholders, could set research agendas and devise effective solutions to the complex problems they face. More investment needs to be made in understanding farmer innovations and also in supporting dynamics within farmer groups, as inputs into IP functioning. This should be aimed at giving more space and voice to farmers in IP processes. Another important observation is that long-term, less tangible, institutional innovation and behavioural change remain unaddressed, while this has been denoted a key success factor towards enhancing the performance of the AR4D system in delivering development outcomes and impacts (van Paassen *et al.*, 2014). Similar challenges have been documented in relation to other collaborative approaches, such as farmer field schools (Sherwood *et al.*, 2012).

Examples of other transformations are that many of the IPs focus on the development or adaptation of technologies and services or their adoption and diffusion (e.g. the IPTAs). Documented IP cases and observations show considerably few examples of the use of methods that stimulate farmer-led innovation, (reflexive) monitoring of platform dynamics, or institutional experiments that represent a large proportion of stakeholder needs in – for example – Central Africa (Schut and Hinnou, 2014). In contrast, many of the IP processes simply lead to researcher-led field trials that are implemented using existing national agricultural extension systems, whose efficiency and innovation capacity is often low (Rivera and Sulaiman, 2009). Here we should add that highly energetic and competent individuals in these systems can make the difference in terms of facilitating IPs and IP activities.

Another concern is that key principles of IPs are being diversely translated and utilised in the hands of different actors and organisations, sometimes against the explicit purposes of the approach (van Paassen *et al.*, 2014). The majority of organisations represented in the IPs, are traditional AR4D institutes, of which many are structured along disciplinary lines, have a long history of technology development and transfer, and have limited expertise on institutional innovation, facilitation of interactive multi-stakeholder processes, or how to address structural power inequalities between stakeholder groups. These issues are key constraints for agricultural innovation and play out in IPs (e.g. Cullen *et al.*, 2014; De Janvry and Kassam, 2004; Ilukor *et al.*, 2015). Although many of the organisations are hiring IP experts and are promoting integrated systems R4D, the real institutional embedding of this will take time as experiences elsewhere have also shown (Botha *et al.*, 2014; Roux *et al.*, 2010; van Mierlo and Totin, 2014; van Paassen *et al.*, 2014).

Understanding IP transformations from a niche-regime perspective

We identify three types of niche-regime interactions related to the IP transformation and performance in AR4D. First, we observed that the AR4D regime simultaneously constrains and enables niche-level IPs. Capacity development for platform facilitators forms a good example of how the AR4D regime supports IP functioning. Capacity development efforts emphasise the need for flexibility, adaptive capacity and learning as essential characteristics of successful IPs in terms of their capacity to respond to the needs and demands of different groups of stakeholders. However, that same AR4D regime also enforces platforms to comply with rigid annual planning, reporting and accounting requirements, that may constraint the IP's capacity to contribute to systemic change and moreover consume large amounts of time and energy from platform facilitators (see also van Mierlo and Totin, 2014). It shows that capacity development needs to be accompanied by new institutional arrangements that stimulate platform facilitators to put their newly acquired competences into practice, because an 'old' institutional setting may hinder a 'new' way of working, as noted by Nettle *et al.* (2013). Another example relates to the platform-led innovation funds, such as used in Humidtropics. These funds enhance IP ownership and space for innovation by making IPs less dependent on existing projects, mandates and interests of research and extension providers (see also Dentoni and Klerkx, 2015; Klerkx and Leeuwis, 2008; Real and Hickey, 2013; Ton *et al.*, 2015). However, these allocated funds are often modest, and insufficient to drive research agendas, compared to allocations for other types of research operations. More emphasis needs to be made in developing specific research proposals in support of IP functioning and research. Also the rules and regulation around the use and accountability of platform-led innovation funds can easily stimulate IPs to procure goods (e.g. fertilizers) or services (e.g. research and extension) from certain partners (i.e. those represented in the AR4D programme), rather than generate innovation-driven research.

Secondly, regimes can strategically keep niche-level developments 'on a leash' (Smink *et al.*, 2015) to align them with regime-level objectives. Following the initial success of IPs as a niche experiment, the approach has become recognised as 'best practice' in AR4D, leading to the adaptation and uptake of the approach by AR4D organisations. The existing body of literature shows how innovative collaborative approaches that perform well at the niche level, can be prone to becoming translated to fit with prevailing mandates and preferences at the regime level (Kloet *et al.*, 2013; Minh *et al.*, 2014). Hence, this may loosen those features which made them distinct from previous ways of working. In relation to IPs, this may imply that they lower their ambition, and devaluate to become mere research projects steering committees with limited systemic change agency, and hence become 'old wine in new bottles'. Although it is too early to conclude this for the IPs analysed in this paper, we do observe some signs of IPs being controlled by the regime that they are supposed to challenge. For example, IP performance and R4D activities are carefully mapped against existing donor demands and development outcome expectations. Proposed activities that are in line with the demands and objectives are being advocated as responding to IP demands. Activities that are not in line with demands and objectives are strategically aligned or adjusted to fit the AR4D programme's needs, or – in the worst case – ignored. We believe that a good starting point could be to clearly position research and development actors, including donors, as stakeholders in the IP process rather than them positioning themselves principally as providers of objective scientific support to the IPs. This may be complicated as long as many of the IPs are initiated and funded by research and development actors. In line with earlier comments on the need for capacity development of IP facilitators, this would also call for creating awareness among AR4D actors, about what working with IPs implies (see e.g. Boogaard *et al.*, 2013). Additionally, this also requires structural changes in working procedures, funding and evaluation of AR4D institutes in order to achieve development outcomes (Hall *et al.*, 2003; Kristjanson *et al.*, 2009).

Thirdly, Kemp *et al.* (1998) provide insights that can help us to explain why IPs struggle to have durable impacts at regime level, noting that regimes remain stable because of path dependency and sunk investments. Such investments have been made in AR4D physical infrastructure such as laboratories or experimental stations, but also in human capacity and funding structures. Consequently, there are actors with a stake in maintaining the status quo, as adaptation of this infrastructure requires new investments, which come with a certain degree of risk. Besides new investments in infrastructure, new competences, partnerships, perspectives and routines need to emerge and develop which comes with insecurity and (often) resistance. People are aware that something needs to change, but preferably 'not in my back yard'. As a consequence, actors and organisations can become locked-in into the incumbent regime. As our experiences highlight, this lock-in does not only apply to research and development actors and organisations, but also to the farmers, government and private sector with whom they collaborate, as well as donors. An important first step is to create an enabling environment and new 'rules of the game' to unlock institutional constraints and logics (Hung and Whittington, 2011; Nettle *et al.*, 2013). This can create space to translate these visions and intentions into concrete reform of research and broader innovation systems trying to accommodate new ways of working. This requires identifying who can champion institutional change from an influential position within AR4D organisations. Such an 'institutional entrepreneur' can reframe paradigm, engage in lobbying, build coalitions and seek resources to enable structural change in AR4D agenda setting and engagement mechanisms (Battilana *et al.*, 2009). In addition capacity development of IP facilitators, IP members and other AR4D actors can enlarge the mental space and willingness for doing things differently (Boogaard *et al.*, 2013; Klerkx and Leeuwis, 2008; Nederlof and Pyburn, 2012). Our survey data show that IP facilitators generally embrace systems-oriented approaches to agricultural innovation. In this capacity development process, exchange between different programmes and projects can be of great value, as noted earlier (Ortiz *et al.*, 2008; Thiele *et al.*, 2007).

Transitioning towards increased systemic capacity to innovate: the role of IPs?

Tensions caused by niche-regime interactions form an inherent part of any change or transition process. Collaborative approaches such as IPs are likely to be adapted and modified to fit political and institutional realities of regime actors, as confirmed by earlier experiences (Sherwood *et al.*, 2012). This – on the one hand – can results in erosion of key qualities of the methodology, but – on the other hand – is also needed to (re)interpret, internalise and understand what approaches like IPs are all about. A paradigm shift from technology-oriented to systems-oriented approaches to innovation requires a transition phase in moving from one regime configuration to another. During this phase, IPs and other initiatives that are supposed to lead to demand-driven, systems-oriented R4D, will have to be accommodated and funded through existing – sometimes seemingly incompatible – supply-driven technology-oriented projects and structures, and supported by actors that do not necessarily have a background, nor interest in systems R4D. During such transition periods, an 'intermediate regime' (Flinterman *et al.*, 2013) can support that new projects will be designed to become more systems oriented, more demand driven, more trans-disciplinary and integrated. In other words, this intermediate regime facilitates progressive and strategic alignment of systems-oriented approaches with technology-oriented regimes.

Progressive alignment will not be linear or one-way, but a process that is likely to be characterised by iteration, reflection, conflict and learning. We believe that IPs can fulfill an important role in facilitating such alignment processes. Rather than merely providing a space to discuss stakeholder R4D needs, sufficient attention should be paid to reflecting on the IP process of learning and adaptive management (Arkesteijn *et al.*, 2015; Kilelu *et al.*, 2013). In that way, IPs can provide a space where expectations and tensions related to transition processes, approaches to innovation, and the new roles and tasks for different stakeholders (including for research and researchers) can be discussed and negotiated (Schut *et al.*, 2011). This joint reconsideration and restructuring has been found essential for collective action and agricultural innovation (Wellbrock *et al.*, 2013).

To support such reflection, more rigorous documentation and analysis of IP processes are needed, using systematic approaches as Neef and Neubert (2011) have done for participatory research. This can lead to better understanding about the key features that influence platform performance in a given context. Preliminary experiences with platform process documentation and learning systems in Humidtropics are promising, although more in-depth analysis of data is required.

CONCLUSION

IPs are increasingly popular as a strategic collaborative approach for shifting from 'traditional' technology-oriented AR4D practice towards 'new' collaborative and integrated systems-oriented AR4D. This paper provides examples of the opportunities and challenges for IPs in supporting such a paradigm shift. Institutional embedding of key principles of IPs in AR4D programmes is taking place, such as the implementation of interlinked platforms across different levels, platform-led innovation funds, new partnerships and stakeholder commitments, and more flexible donor projects. However, it is worrying that researchers and institutional mandates continue to dominate the IP and broader AR4D agenda. Our findings suggest that many of the IPs focus on technology testing and adoption, although there is increasing attention for gender and nutrition. Institutional dimensions of agricultural innovation (e.g. related to policy, markets and access to land, credit, inputs and services) are currently being addressed to a much lesser extent. We wonder hence whether these IPs reinforce rather than challenge existing agricultural innovation paradigms, and whether they have the potential to contribute to more systems-oriented approaches to agricultural innovation. In that sense, we are witnessing the risk that IPs and other systems-oriented ways of working remain isolated cases of success rather than becoming broadly embedded in AR4D systems. This is despite efforts for better collaboration and exchange of experiences at the global AR4D level, such as in the CGIAR's Institutional Learning and Change initiative (e.g. Ekboir *et al.*, 2013).

By analysing the embedding of IPs through the lens of niche-regime theory, it has become clear that this is process of massive paradigm shift and mind-set alignment at both institutional and individual levels across the whole spectrum of stakeholders. Such a shift is unlikely to take place only through isolated experimentation with new approaches such as IPs, but require structural and broad-based learning and capacity development. System innovations will not only require reframing of paradigms, but also changes in organisational mandates and incentives, procedures and funding. These processes are of a highly political nature given path dependencies and existing investments and interests, and therefore require active institutional entrepreneurship, for which there are no clear recipes. However, decision makers in AR4D that champion the IP approach and seek to enhance systemic capacity to innovate could benefit from (1) developing a broader perspective on how AR4D fits within a broader package of agricultural innovation systems in which instruments such as IPs merit separate and dedicated funding and (2) learning from how decision makers elsewhere have created an enabling environment and durable incentives to institutionalise demand-driven AR4D to support systemic capacity to innovate.

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