ICIMOD

AIRCA
Association of International
Research and Development
Centers for Agriculture

FOR MOUNTAINS AND PEOPLE

Strengthening AIRCA Monitoring and Evaluation Systems

Plan for Change

Develop/revisit ToC

Reflexive Practice

Process documentation

Implement

Project/programme response: stabilize and amplify beneficial outcome trajectories

Compare and contrast expected ToC with emerging ToC

Look for emergent and planned-for change

System response: expected and unexpected outcomes, good and bad

About ICIMOD

The International Centre for Integrated Mountain Development (ICIMOD), is a regional knowledge development and learning centre serving the eight regional member countries of the Hindu Kush Himalaya – Afghanistan, Bangladesh, Bhutan, China, India, Myanmar, Nepal, and Pakistan – and based in Kathmandu, Nepal. Globalisation and climate change have an increasing influence on the stability of fragile mountain ecosystems and the livelihoods of mountain people. ICIMOD aims to assist mountain people to understand these changes, adapt to them, and make the most of new opportunities, while addressing upstream-downstream issues. We support regional transboundary programmes through partnership with regional partner institutions, facilitate the exchange of experience, and serve as a regional knowledge hub. We strengthen networking among regional and global Centres of excellence. Overall, we are working to develop an economically and environmentally sound mountain ecosystem to improve the living standards of mountain populations and to sustain vital ecosystem services for the billions of people living downstream – now, and for the future.

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Strengthening AIRCA Monitoring and Evaluation Systems

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Acknowledgements

About AIRCA

The Association of International Research and Development Centers for Agriculture (AIRCA) is an international, non-profit alliance of nine leading international research institutions focused on increasing food and nutritional security by supporting smallholder agriculture and rural enterprises within healthy, sustainable and climate-smart landscapes.

The formation of AIRCA was stimulated by the need for integrated action to deliver sustainable agricultural intensification at the landscape scale. AIRCA has already grown into a strong partnership of like-minded organizations with the capability and track record to address complex problems at a broad geographic scale and across several sectors. AIRCA members are committed to combining their experience of successful approaches, opportunities, and challenges in moving farmers beyond subsistence and their communities from poverty to prosperity.

AIRCA members have activities in all major geographic regions and ecosystem types. All have a proven track record of research, development, and implementation, working closely with farmers, extension systems, national research institutes, non-governmental organizations (NGOs), and the private sector across a wide range of crops and ecosystems.

Members

CAB International	Centre for Agriculture and Biosciences International
CATIE	Tropical Agricultural Research and Higher Education Centre
CFF	Crops For the Future
ICBA	International Centre for Biosaline Research
ICIMOD	International Centre for Integrated Mountain Development
icipe	International Centre for Insect Physiology and Ecology
IFDC	International Fertilizer Development Centre
INBAR	International Network for Bamboo and Rattan
WorldVeg	World Vegetable Center

Vision

Healthy landscapes for improved livelihoods and food security

Mission

Putting research into use by strengthening capacities for sustainable improvements to incomes, food and nutrition security in healthy landscapes

Acronyms and abbreviations

AIRCA	Association of International Research and Development Centers for Agriculture
AR4D	Agriculture Research for Development
CAB International	Centre for Agriculture and Biosciences International
CATIE	Tropical Agricultural Research and Higher Education Centre
CFF	Crops For the Future
CoP	Community of Practice
IA	Impact Assessment
IATI	International Aid Transparency Initiative
ICBA	International Centre for Biosaline Research
ICIMOD	International Centre for Integrated Mountain Development
Icipe	International Centre for Insect Physiology and Ecology
IFDC	International Fertilizer Development Centre
INBAR	International Network for Bamboo and Rattan
M&E	Monitoring and Evaluation
MEL	Monitoring, Evaluation and Learning
MELS	Monitoring, Evaluation, Learning and Sharing
PIPA	Participatory Impact Pathway Analysis
PME	Planning and M&E
POMS	Plantwise Online Management System
RBM	Results Based Management
RCTs	Randomized Controlled Trials
SPM&E	Strategic Planning, Monitoring and Evaluation
SSIA	Social Science and Impact Assessment
SWOT	Strengths, weaknesses, opportunities and threats
ToC	Theory of Change
WorldVeg	World Vegetable Centre

Abstract

This paper was written collectively by monitoring and evaluation (M&E) specialists of the Association of International Research Centers for Agriculture (AIRCA) for the purpose of strengthening the M&E systems of individual centres within AIRCA. The paper grew out of the AIRCA M&E workshop in March 2017 and the subsequent use of a self-assessment tool. The tool enabled the authors to benchmark and characterize their respective centres' M&E systems and identify ways to improve them. The paper identifies experiences and practices to learn from across centres and concludes with 10 key lessons for M&E systems. The process of writing this paper collectively has strengthened the AIRCA community of practice on M&E within AIRCA to which the authors belong.

Introduction

The Association of International Research Centers for Agriculture (AIRCA) was set up to bring together agricultural research for development (AR4D) organizations facing similar challenges and sharing similar principles. One topic of common interest is monitoring, evaluation, and learning (MEL). AIRCA initiated a community of practice (CoP) on monitoring, evaluation, and learning (MEL) in March 2016 with an inaugural workshop at the World Vegetable Center (WorldVeg). Workshop participants agreed to support the development of sound M&E systems in AIRCA centres so that they are fit for purpose and contribute to increased accountability and learning. The second meeting was held at ICIMOD, 1–3 March 2017. Workshop participants decided to write this paper based on the insight that came out of this workshop and subsequent reflection and learning. One objective of this paper is to benchmark centres' M&E systems and explore future trajectories centres may take. A second objective is to share learning and good practice among AIRCA centres and, through the collective process of holding the workshop and writing this paper, strengthen the community of practice.

The first part of this paper describes the March 2017 workshop and the insights it generated. The second part describes the learning and reflection after the workshop. The third part considers implications and next steps for centre M&E units and the community of practice. The paper is part process write-up, part method development, and part collective reflection to identify lessons and next steps. The structure is not that of a conventional academic article that looks at one issue systematically and in detail. Rather it is a story of an ongoing journey in which the authors are seeking to build a community of practice to strengthen their respective centres' monitoring, evaluation, and learning systems.

Part 1: The March 2017 Workshop

Workshop topic: The need for complexity-aware M&E system to achieve impact at scale

The topic for the second Community of Practice (CoP) meeting was the need for complexity-aware M&E because of growing awareness of the importance of taking complexity into account in agricultural research for development programmes. This comes from a recognition of the need for outcome-oriented planning – as shown by the increasing popularity of concepts such as logframes, results-based management, impact pathways, theory of change, and value-for-money – as well as the realization that projects intervene in complex socio-ecological systems in which some outcomes, positive and negative, cannot be predicted.

For at least the last 25 years, complexity science has held out the promise of 'much coming from little', that is, the idea that small, well-chosen interventions can lead to disproportionately large impacts (e.g., Axelrod and Cohen 2000; Gladwell 2006; Westley, Zimmerman, and Patton 2009). A complex system is "one whose properties are not fully explained by understanding of its component parts" (Gallagher, Appenzeller, and Normile 1999, 79) and where outcomes[1] are driven in-part by what has happened before, i.e., path dependency. The mechanism by which 'much can come from little' is emergence, which Goldstein (1999, as cited in Corning 2002) defines as "the arising of novel and coherent structures, patterns and properties during the process of self-organization in complex systems".

On the face of it, being complexity-aware should help to achieve impact at scale. However, this potential has not generally been realized in the Agriculture Research for Development (AR4D) community. The community is strong in reductionist science that focuses more on the components of systems (e.g., a single crop or technology) than on the interactions between system components.

Linear thinking of how activities will lead to outcomes, without provision for unexpected outcomes and possible feedback loops, is particularly pervasive at the project level. A project has a defined start and end point and specific objectives and deliverables. The short duration of projects (typically one to four years), their limited geographical scale (mostly the community or district level), and well-defined set of deliverables makes it difficult to adapt to unexpected outcomes and emerging feedback loops. Such features may also not be observable within a four-year project. In addition, many AR4D projects work at the research end of the research-to-development continuum, for instance, by doing research on the distribution and spread of particular pathogens or looking for new sources of disease resistance in tomatoes. Several follow up projects may be required to turn this knowledge into interventions that create development outcomes.

Complexity awareness is therefore more important at the programme level, which can be defined as a group of related projects managed in a coordinated way with the objective of obtaining certain outcomes. Unlike projects, programmes do not have a defined end date, their objectives are not fixed but can change over time, and their portfolio of projects also changes over time.

Unfortunately, most M&E systems are focused at the project level rather than at the programme level because M&E systems are usually designed to meet the expectations of particular project donors. The challenge for AIRCA members, therefore, is to develop robust M&E systems that are able to guide learning and decision making at the programme level. Programme M&E is not simply the sum of project-level M&E efforts.

This said, it needs to be recognized that international agricultural research centres – in Association of International Research and Development Centers for Agriculture (AIRCA) but also in the CGIAR – are highly flexible and adaptive organizations. Most produce a new strategic plan every five to eight years, they regularly reorganize programmes to meet the most current development challenges, they can open and close country and regional offices relatively

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[1] Outcomes are changes in behaviour. They can also be new patterns, structures, and processes of self-organization to which programme activity is contributing.

easily, and they can terminate staff contracts with three to six months' notice if needed. These international centres are therefore much more flexible than universities or government research organizations. This adaptive characteristic should make these centres ideally suited to embracing complexity awareness in programme- and centre-level M&E.

Conceptual framework

Two frameworks for guiding complexity-aware M&E were presented as input during the workshop.

Figure 1: **A framework for guiding complexity-aware M&E**
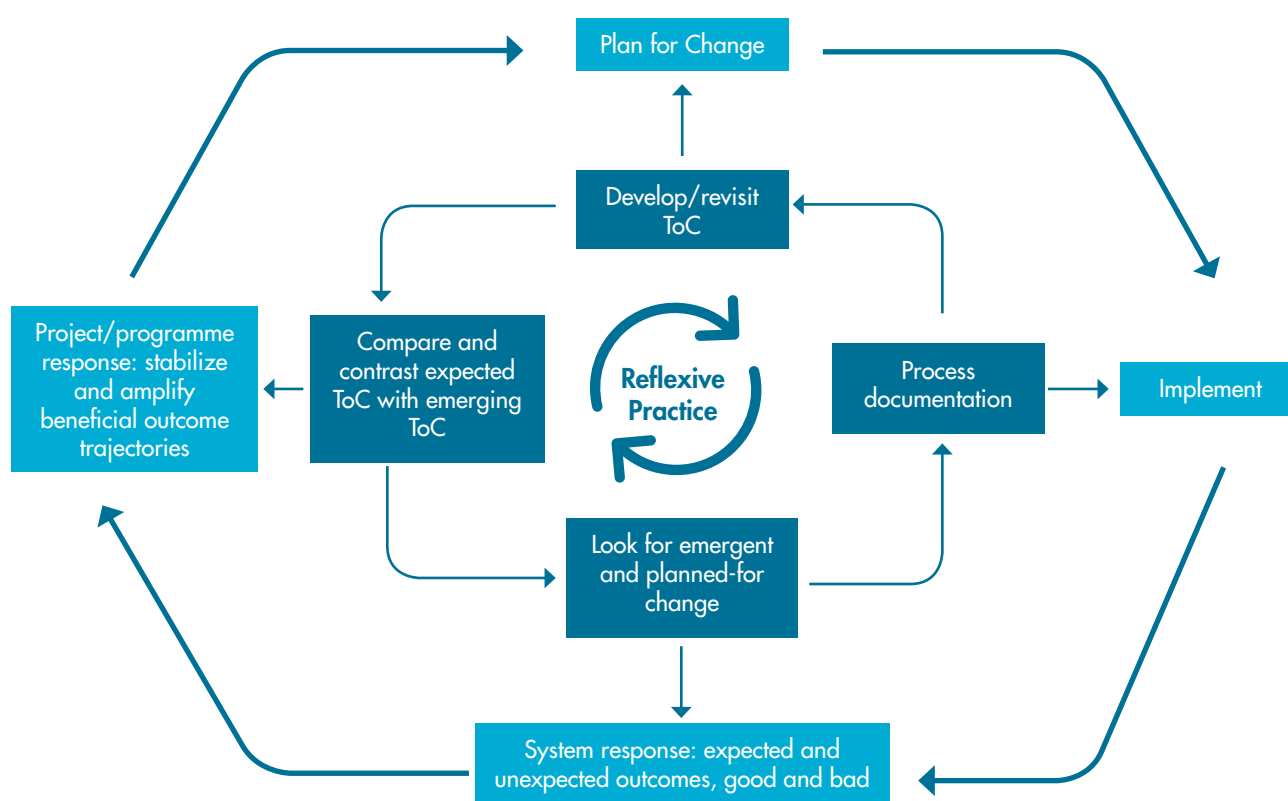
The first framework (Figure 1) is based on reflexive practice which some authors have identified as crucial to navigating complexity (e.g., Klerkx, van Mierlo, and Leeuwis 2012; van Mierlo, Arkesteijn, and Leeuwis 2010). Reflexive practice is at the heart of the process whereby participants become better able to reflect on their own actions so as to engage in a process of continuous learning and adaptation to change (Schon 1983).

The outer cycle of Figure 1 shows a project or programme intervening in a complex system. It shows the system responding to project intervention in terms of the emergence of patterns of behaviour that the project subsequently chooses to amplify and stabilize, if the patterns are beneficial. The patterns may serve to strengthen existing outcome trajectories or may themselves represent emergent outcome trajectories. An outcome trajectory is a self-organizing and vertically integrated network of actors that put social, institutional, and/or technological innovation to use over time. The network is vertically integrated in the sense that users are linked to actors who provide, support, adapt, and research the innovation. An outcome trajectory is also sometimes called an innovation trajectory.

The inner cycle shows how M&E supports the outer one through the use of theory of change (ToC) to support reflexive practice. It shows planning for change being informed by the development and revisiting of a theory of change. built from evidence and assumptions about how change is happening, or is expected to happen. The M&E system documents system response during implementation so as to identify contribution to emerging or established outcome trajectories. Comparing what is starting to happen with what was expected and planned for, helps determine how the programme subsequently adjusts its plans and responds. The original ToC is populated with greater detail, and adjusted if necessary, and so on.

Figure 2: An overarching complexity-aware theory of change to guide M&E and impact assessment
(Douthwaite et al. 2017, 5)
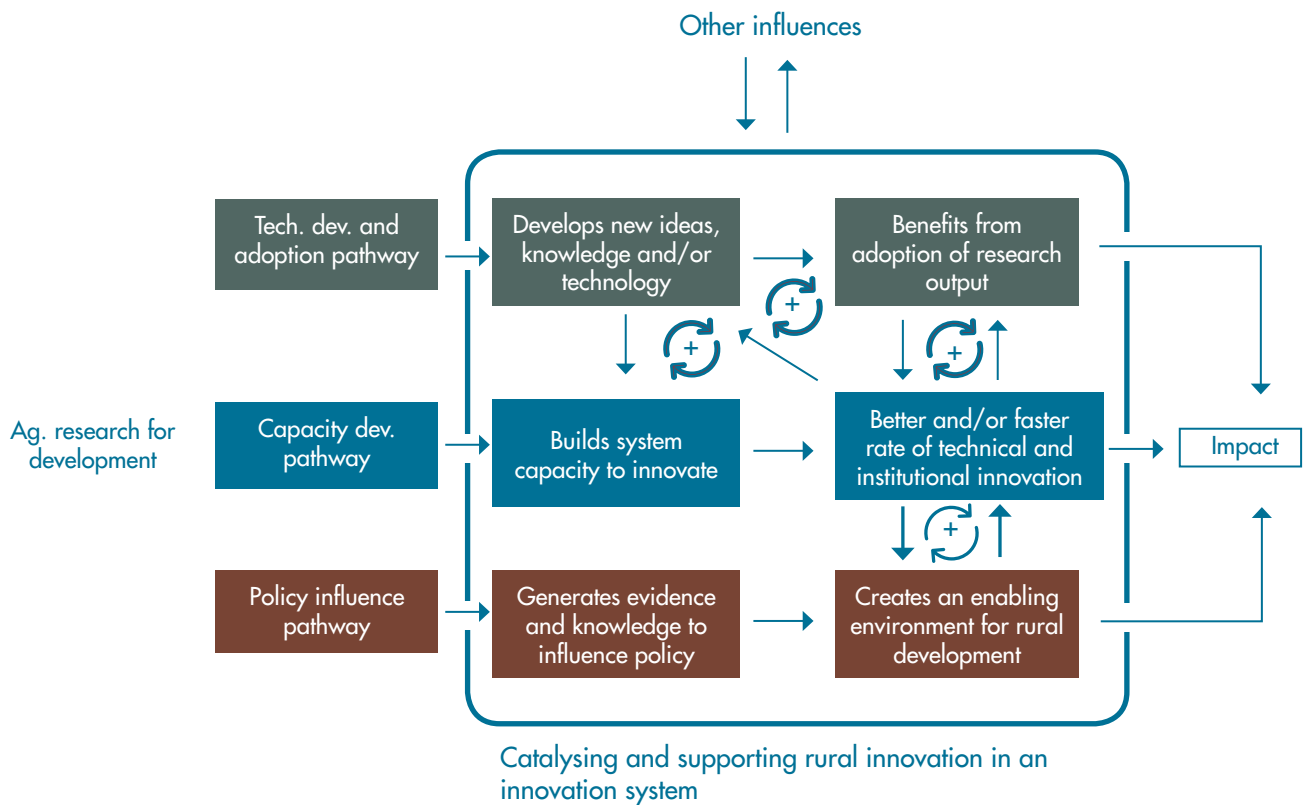
At a higher level, the projects, initiatives, or programmes going through the cycle in Figure 1 are part of how agricultural research for development as a whole contributes to impact, shown in Figure 2. Agricultural research for development achieves impact by catalysing and supporting processes of innovation through three pathways (Douthwaite et al. 2017). In the technology development and adoption pathway, researchers develop new technological, social, and/or institutional innovations that are subsequently adopted by the next users and lead to impact. In the capacity development pathway, the process of carrying out research builds the capacity of rural innovation systems to innovate. Participatory and collaborative research brings different stakeholders together to identify common challenges and builds structural and cognitive social capital in the process. In the policy influence pathway, researchers generate insight and evidence with the specific intent of influencing policy, for example, with respect to strategies for agriculture to mitigate and adapt to the effects of climate change. Policy change then helps build an enabling environment for ongoing innovation.

The ToC is complexity aware as it recognizes four possible feedback loops. In the first cycle, more innovation leads to more learning, which leads to greater capacity and opportunity to innovate.[2] In the second cycle, faster rates of innovation speed up the adaptation and adoption of research output, thus increasing impact. In the third cycle, benefits from technology adoption motivate people to innovate, which promotes further technology adoption and impact. In the fourth cycle, faster rates of institutional innovation create an enabling environment for more innovation.

The model suggests that monitoring and evaluation should look for progress along the three pathways as well as evidence of the four feedback cycles happening. The feedback cycles will drive the scaling of outcomes and impact.

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[2] Strengthening capacity to innovate includes increasing the links between actors, their links to new ideas and technology, their ability to experiment and evaluate the results, and their ability to learn and share (Leeuwis et al. 2013).

Reflections from the workshop

The questions that complexity-aware M&E needs to answer

One of the challenges in operationalizing concepts from complexity science is making them workable in practice. Hence, based on a presentation of the two frameworks, participants discussed and agreed on the characteristics of complexity-aware M&E and ways of carrying it out that make sense to them (Box 1).

Box 1: Characteristics of complexity-aware M&E and ways of carrying it out

Complexity-aware M&E (including impact assessment) should
- Recognize that causality is not usually linear
- Be aware of unintended consequences and unexpected results
- Be aware that challenges and outcomes may not be perceived at the start of a project

Ways of carrying out complexity-aware M&E include
- Using designs that cater to expected and unexpected results without losing rigour
- Taking a holistic approach to understanding change
- Understanding causal pathways
- Being as simple as you can while not oversimplifying
- Using designs based on context and attributes of the project being evaluated – no single method is best for every impact evaluation and a mixed method approach is often preferred

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An important insight from the session was the need to explain and demonstrate the value of complexity-aware M&E approaches to centres' staff as not everyone is familiar with the concepts of emergence and feedback loops (both positive and negative) in systems responding to outside intervention.

Participants then used this understanding to derive four questions that a complexity-aware M&E system should be able to answer. The first and the last also apply to conventional M&E. The second question refers to double-loop learning in which participants regularly question the underlying causal pathways upon which the work is premised, something that conventional M&E does not usually do (Argyris 1977).

- Are we doing what we said we would do?
- Do we know if what we said we would do is actually the right thing to do?
- Are we looking for expected and unexpected outcomes?
- Do we know what impact we are having?

Participants then rated the M&E systems of their own centres against their ability to answer the questions. In the ensuing discussion, we realized that all of our centres carry out M&E at the project level to answer the first question, driven by the need to be accountable to donors. However, the real opportunity to learn, reflect, and adjust is at the programme- and centre-levels where time frames are longer and centres can establish their own systems for their own purposes. We realized that some centres had better developed centre-wide systems than others. Most participants felt that their respective centres need to progress towards having a centre-level system able to capture learning across projects and programmes in place and feed it into strategic planning, as well as a system for tracking progress towards programme and centre outcome targets.

Participants carried out a SWOT analysis of their respective M&E systems, as shown in Box 2.

Box 2: **SWOT analysis carried out by workshop participants reflecting on their respective centre's M&E systems**

Strengths and opportunities

- Existing capacity
  - Expertise in M&E and impact assessments (IA) across AIRCA
  - Long-term experience in some centres
  - M&E units in some centres

- Existing systems and methods
  - Online M&E systems
  - M&E tools
  - M&E systems contributing to learning
  - More collaboration between qualitative and quantitative methods
  - Impact Assessment (IA) methodologies available and shared

- Learning and sharing
  - Opportunity to learn from each other
  - Sharing experiences and learning
  - Holding regular meetings with the MEL CoP and having an information platform supported by the AIRCA secretariat

- Donor interest in M&E
  - Increased realization of importance of M&E
  - Convincing top-level management and donors of complex M&E systems and tools
  - Donors interested in supporting M&E development

- Strategic plans for all centres (to which M&E systems can better link)

Weaknesses and threats

- Resource constraints
  - Resource constraints for M&E (staff, budget) of some centres
  - Funding uncertainties
  - Weak M&E capacity of some centres

- Lack of recognition
  - Not all staff see importance/appreciate need for M&E
  - M&E systems not always linked to/recognized by strategic plans

- Jumping to impact studies without clear understanding of impact pathways

- Expecting positive results

- Lack of methods to track large numbers of indirect beneficiaries

Part 2: Reflection and Learning After the Workshop

Further development and use of the self-assessment tool

After the workshop, we further developed the self-assessment tool to benchmark M&E systems of the centres and explore the trajectories they might take. We identified four levels a centre-wide MEL system should pass through to be fully developed. For each stage, we identified performance questions to be answered.

Table 1: **Self-assessment of centre-level M&E systems**

Stages in the development of a centre-wide M&E system	Self-assessment questions
A. Basic accountability Meeting basic donor accountability requirements	• Does the centre have a project-level M&E function and a mandated office, or equivalent in place that tracks delivery of results on donor contracts? • Does the M&E function check on the quality of reporting? • Does the office help negotiate course corrections and take remedial steps in the case of underperformance?
B. Outcome monitoring and impact evaluation Tracking project outcomes, both expected and unexpected, and showing their contributions to programme- and centre-level targets and goals	• Does the centre have defined institution- or centre-level strategic results and targets logically linked with its vision and mission? • Does the centre have systems in place that aggregate programme or project outcomes to show their combined contribution to programme- and centre-level goals? • Does the centre have systems in place to track programme or project outcomes both expected and unexpected? • Does the centre have systems in place to establish relevant evaluation designs following rigorous methodologies? • Does the centre have systems in place to develop baselines following rigorous evaluation designs? • Does the centre conduct end-line studies following rigorous evaluation designs? • Does the centre have systems in place for conducting internal as well as external joint monitoring missions, midterm evaluations, and end of project or programme evaluations? • Does the centre do ex-ante impact assessment? • Does the centre do ex-post impact assessment?
C. Learning and strategic planning Using learning across projects and programmes in strategic planning	• Does the centre have a results-based management system in place for programme or project planning and budgeting (annual as well as programme or project life cycle)? • Does the centre have systems in place for continuous review and reflection on programme or project progress as well as performance? • Does the centre construct theories of change at the project/programme/centre level? Describe the respective processes specifying who is involved and how. • Does the centre revisit theories of change at the project/programme/centre level? • Does the centre use learning from outcome monitoring, revisiting theories of change and/or impact assessment as part of strategic planning?
D. Evaluation research development MEL approaches, and contribution to research on uptake and scaling processes	• Does the centre develop and publish MEL methods? • Does the centre publish papers on scaling research/research that contributes to social science theories about how change happens/research to develop generalizable theories of change that apply to families of similar projects?

On analysing the results, we found that some of the self-assessment questions could be combined or eliminated because they were not particularly meaningful or needed rewording as they had been understood differently. We also shortened the questions to help with the visual interpretation of the results. The revised list of questions is shown in the radar plots (Figures 3 and 4). We made the following changes:

- The first question was split into two, the first about whether centres carry out project-level M&E and the second about whether they have a central function overseeing it [A1].
- The question on course corrections was deleted as all centres dealt only with them if they had to on a case by case basis [A].
- The question on whether the centre has a system in place to establish relevant evaluation designs was dropped because the meaning of "system" was unclear [B].
- The question on centre-level strategy changed to whether a centre is using a strategic plan [B1].
- The two questions on impact assessment were combined [B6].

We rated answers using a 1 to 5 scale: 1 = no or not at all, 5 = yes or fully, and 2, 3, and 4 = gradations between yes and no.

Graphing the results (Figures 3 and 4) revealed that the six centres fall into two categories: a group made up of the International Centre for Integrated Mountain Development (ICIMOD), the International Centre of Insect Physiology and Ecology (icipe), and the World Vegetable Centre (WorldVeg) – Figure 3 – which have a central results-based M&E management system ('centralized group') and a group made up of the International Centre for Biosaline Agriculture (ICBA), the International Fertilizer Development Centre (IFDC), and the Centre for Agriculture and Bioscience International (CABI) – Figure 2 – that leaves M&E largely up to projects to carry out according to individual donor requirements ('devolved group'). CABI actually falls into both categories as its Plantwise programme has a centralized results-based management system while this is not equally used for the other programmes.

Figure 3: **Radar plot of AIRCA centres with a more centralized M&E system**

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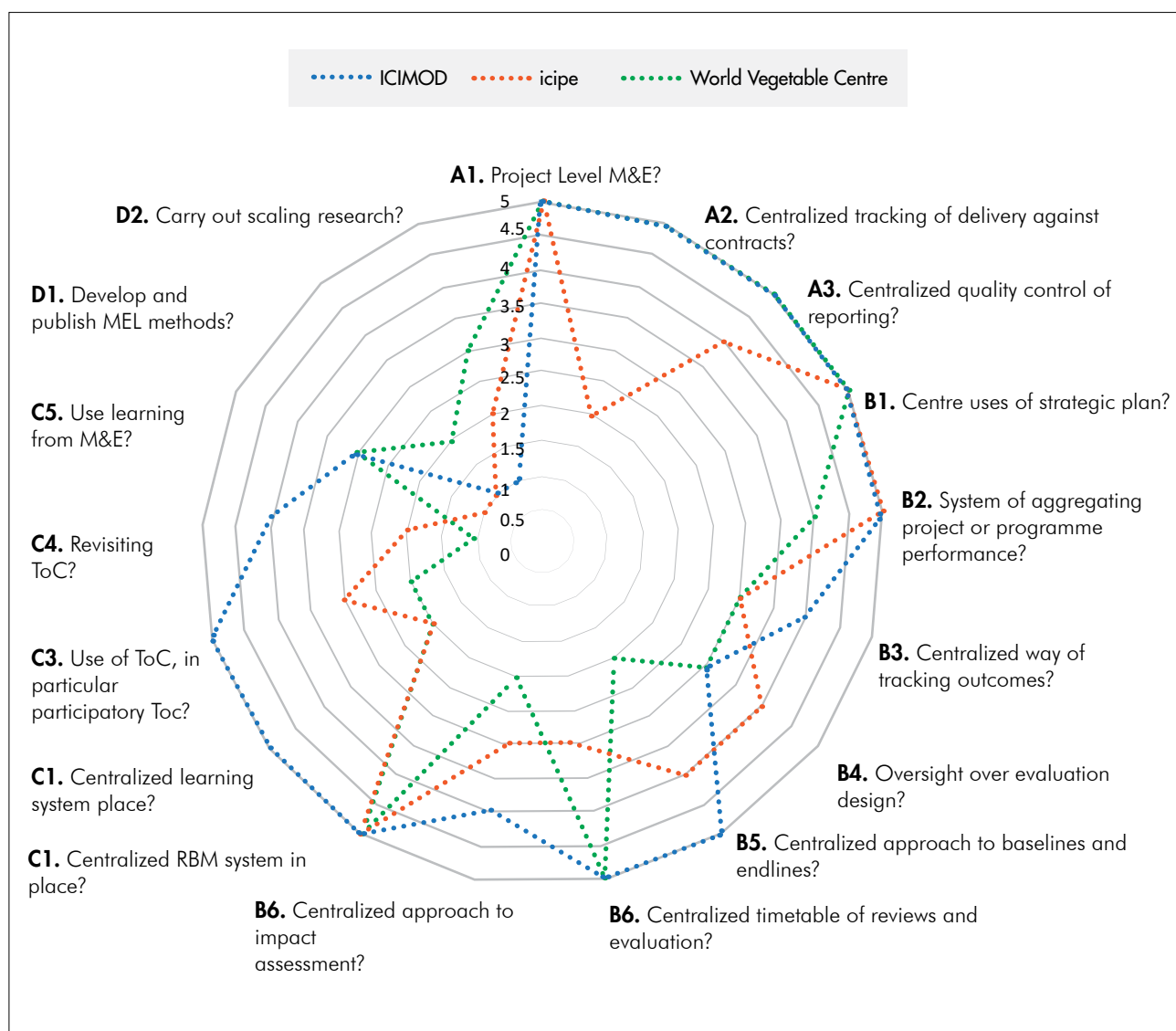
Figure 4: **Radar plot of AIRCA Centres with a more devolved M&E system**
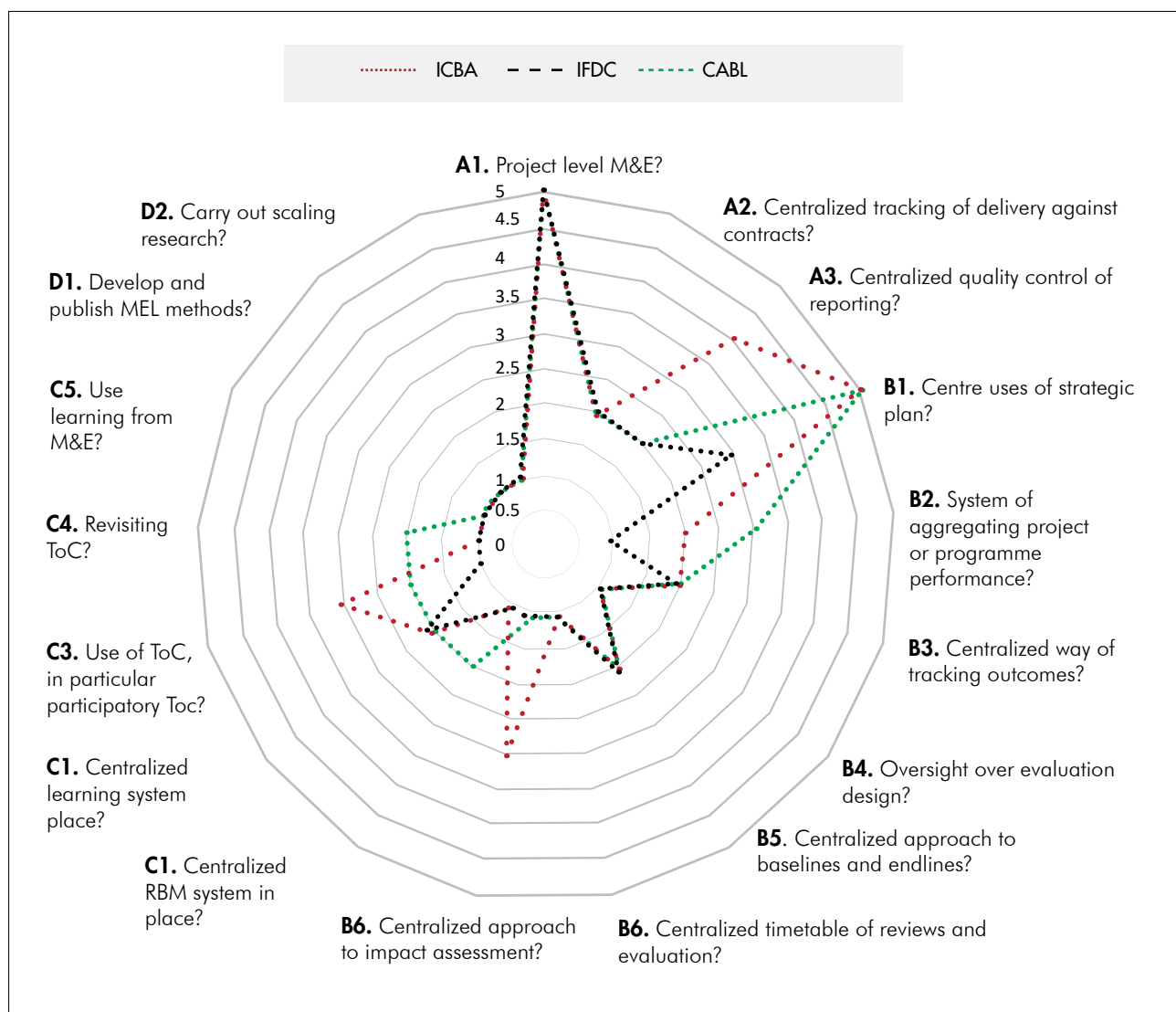
Characterizing centre M&E systems

We used the results to further categorize centre M&E systems against the four levels identified in the self-assessment tool, as described below.

Basic accountability to donors at project level

All centres carry out project-level M&E to meet donor accountability requirements. Project managers are responsible for generating periodic reports to send to donors. Some larger projects employ an M&E specialist who takes over some of this responsibility. All centres have a finance department which produces the financial part of project reporting.

ICIMOD, WorldVeg, icipe, and ICBA have units responsible for quality control and timeliness of project-level reporting. At ICIMOD, the role is played by the Strategic Planning, Monitoring, and Evaluation (SPME) unit, an independent unit that reports to the Director General. In WorldVeg and ICBA, the role is carried out by the Research Director's office while in icipe a grants office at the Director General Office checks reports before they are sent to donors. icipe plans to have its M&E centrally coordinated by the Social Science and Impact Assessment Unit. Since the workshop, IFDC has initiated a centralized monitoring system using a cloud-based platform that reflects and tracks both project- and institutional-level objectives.

Outcome monitoring and evaluation

All six centres have a strategic plan that identifies centre goals and targets. ICIMOD, icipe, and WorldVeg have a centre-level strategy and results framework that shows a hierarchy of results. Projects and programmes are expected to report against this framework to show their contribution to common centre goals. WorldVeg, for example, has a system in place in which project outputs and outcomes are linked to Flagship Programme goals. Indicators are entered in a specialized monitoring system, called VegOne. The WorldVeg library collates published output.

The other centres are moving in this direction. In ICBA, for example, the Research and Innovation Director (DRI) Office is developing a system based on interviewing principal investigators once a year on delivery against key performance indicators. The DRI team then complement this information by reviewing project reports and technical outputs to identify quantitative data to go into an annual report.

The centralized group centrally track and aggregate outcomes against their respective results frameworks as part of their respective results-based management systems. The focus is on tracking expected outcomes. ICIMOD is starting to identify unexpected outcomes through learning reviews, documenting impact stories, and revisiting theories of change. Icipe and WorldVeg hold annual meetings that provide room for identifying unexpected outcomes. The devolved centres track outcomes at the project level, but don't link them to their strategic plan.

The centralized group have some oversight over evaluation designs used. WorldVeg has a research programme on Enabling Impact that takes responsibility for ex-post and some ex-ante impact assessment. At icipe, the Social Science and Impact Assessment unit plays a similar function. Both units are staffed by agricultural economists who carry out the research. ICIMOD, on the other hand, puts more emphasis on commissioning internal evaluations and external reviews that the SPM&E unit oversees as an independent unit. These are different from impact evaluations and are also carried out by ICIMOD and WorldVeg for some projects. The SPM&E unit at ICIMOD advocates for establishing relevant evaluation designs for all initiatives and pilots, and also carries out baselines and endlines and conducts impact assessments. The devolved centres rely more on consultants to carry out external evaluations per donor requirements.

Learning and strategic planning

In general, projects and programmes in all AIRCA centres learn through regular dialogue with their partners and clients. This learning informs course corrections and the creation of new projects and units. ICIMOD has gone furthest in integrating learning and strategic planning into its M&E system based on the use of ToC. The process took 12 years and is described in Box 3. The SPM&E leader argues that the best way to empower M&E systems is to make sure the information they generate is used for strategic decision making because if people see that M&E information is heeded at high levels they will be motivated to be part of generating and making sense of it. ICIMOD is the only centre to base its learning system on participatory development and revisiting theories of change. All initiatives are supported by SPM&E in doing so. SPM&E supports initiatives to go through the inner cycle in Figure 1.

Other centres develop ToCs if required by donors. This is usually done by the project manager, except for large projects where key partners will also be involved. Theories of change are generally not revisited within the scope of a project.

WorldVeg holds an annual research planning meeting to review progress and learn lessons. At CABI, the Plantwise programme carries out annual reviews focused on delivery of outcomes and impact. Other ways that centres learn is through carrying out evaluations. WorldVeg has found that the organization learns more if the evaluations are carried out by its own staff rather than external consultants. Also, the need for learning about early outcomes is different across centres and programmes. Research that involves laboratory work, for example, takes longer to generate outcomes than programmes set up to tackle development challenges within five years.

Evaluation research

Some of the AIRCA centres (e.g., WorldVeg, icipe, ICIMOD) publish research that contributes to understanding how their interventions bring about change at scale (e.g., Schreinemachers et al. 2017a-d; Kassie et al. 2017; G. M. Shah et al. 2018; Shah G et al 2017; Tariq et al 2017). ICIMOD is starting to publish its work on theory of change.

Centre learning and good practice

After the workshop, participants reflected on their own centre's learning and good practice and several wrote down experiences from which others could learn the most. The contributions are not attempts to summarize the respective centre's entire MEL system.

CABI – Plantwise leading by example

The Plantwise programme provides plant health information to small-holder farmers and is considered to be the trailblazer for M&E within CABI. The following summary of the Plantwise M&E system is provided by Frances Williams, CABI's M&E manager.

Plantwise began in 2011 with the first work on M&E beginning the following year. In 2013, CABI staff were introduced to the main concepts behind Plantwise M&E, which was a relatively new approach within the centre. M&E within the programme is structured around six pillars (Danielsen et al. 2015):

1. Progress tracking of activities and outputs against set targets
2. Process evaluation to assess the efficiency and performance of programme implementation
3. Evidence collection on outcomes, impact, causality, and issues around partnerships
4. Learning through joint critical reflection on intervention and implementation
5. Context analysis to assess how programme and country contexts affect Plantwise interventions and implementation, positively and/or negatively
6. Capacity building to support the uptake of suitable M&E practices in country as part of Plantwise's plant health systems strengthening strategy

Basic routine monitoring procedures are in place across the programme through the Plantwise Online Management System (POMS) which is the key tool for gathering information and reporting on plant clinics and programme activities at the country level. Process evaluation, evidence collection, learning, and context analysis are all assessed at both country and programme levels through a mixed method approach.

Table 2: **Components of the Plantwise M&E system**

Process evaluation	Clinic performance monitoring*
	Tracking of changes in M&E practices*
	Data validation
	Follow up on key interventions*
	Case studies*
Evidence collection	Evaluations
	Special studies/case studies*
	Partner/user feedback
	Action research
	Quasi-experimental studies
	Bio-economic modelling
	RCTs
Learning	Review/cluster meetings*
	Lessons learned workshops*
	Annual meetings*
	Sustainability road map*
Context analysis	Stakeholder analysis*

* Activities included in the systematic M&E plan for all countries.

Assessing changes as well as causal inference are done through a variety of evaluation designs (e.g., experimental, case based, participatory) using a mix of qualitative and quantitative methods. Plantwise's degree of complexity, both in country and across countries, means that approaches explicitly aimed at capturing different kinds of impact as well as unintended effects ('surprises') of the programme are required. The choice of an evaluation approach is pragmatic and driven by what is suitable, feasible, and affordable in the given situation (Danielsen et al. 2015).

In 2012 and 2013, Plantwise focused on establishing progress tracking systems at the country level and internally. In subsequent years it fine-tuned the progress tracking and capacity building while starting evaluation work. It also undertook internal capacity building and capacity building with its partners to start to embed M&E processes within the programme.

In 2013, it initiated a five-year rigorous impact assessment, using a randomised control trial. Since an initial study in Kenya in 2013, it has completed or is about to complete 22 studies in 19 countries, with most studies carried out in more than one country to enable cross-country learning. The studies initially focused on testing and understanding some of the programme assumptions, such as whether Plantwise was increasing access to the plant health system and linkages within it. More recently, the focus of the studies has shifted to examining the programme indicators at impact and outcome levels, ensuring that any gendered nuances are explored. Some studies have used a quasi-experimental approach. At a minimum, a further six studies will be undertaken, as well as a further large-scale impact evaluation in Pakistan. These studies are complemented by smaller country-level case studies in 2017 and will continue for the next three years. The growth of M&E work within Plantwise is reflected in the budget which increased from 6% of the Plantwise budget in 2013 to a planned 16% in 2017.

WorldVeg: Learning through impact evaluation

WorldVeg has made extensive use of impact evaluation to improve intervention designs, guide strategic planning, and document returns to investment. The following examples were provided by Pepijn Schreinemachers, Flagship Programme Leader for Enabling Impact.

Use of impact evaluation to improve intervention designs: An evaluation of school garden interventions in Nepal and Bhutan showed school gardens – combining education in gardening and nutrition with community involvement – were effective in increasing children's (10–15 years old) knowledge and awareness about fruit and vegetables and their stated preferences for eating them, but did not translate into increased fruit and vegetable consumption (Schreinemachers et al. 2017a, b). The results of the impact studies suggested that the intervention needed a stronger component influencing parents' food preferences and also needed to stimulate local fruit and vegetable production. The intervention design was consequently adjusted and there are plans for testing the improved design.

Use of impact evaluation to guide strategic planning: WorldVeg distributed over 50,000 seed samples of tomato and chilli pepper to institutions in 138 countries from 2001 to 2013, but until recently lacked a clear understanding of the extent to which it was used. Two studies followed up with public and private seed producers in India and South Asia and showed widespread use of the centre's material among private seed companies (Schreinemachers et al. 2017a; Turner 2016). About 50 tonnes of mostly hybrid tomato and pepper seed sold annually in India and Southeast Asia contains material developed at WorldVeg — potentially reaching over 1 million farmers per year. These studies helped to show the importance of the private sector in the impact pathway of WorldVeg vegetable breeding programmes, and the findings were instrumental in developing a new strategic partnership with private seed companies in Asia.

Use of impact evaluation to quantify returns on investment: WorldVeg has made a long-term commitment, since the mid-1990s, to improving tomato production in Africa through the introduction of improved tomato varieties. A recent impact evaluation quantified that currently about 50% of commercial seed sales of tomatoes in East and Southern Africa are varieties developed by WorldVeg (Schreinemachers et al. 2017d). For Tanzania alone, the centre and its partners invested about USD 10.1 million in tomato research and development, and this had generated economic value of about USD 255 million by 2014. An internal rate of return of about 26% is evidence for attractive returns on investment in vegetable R&D for Africa.

These examples illustrate the usefulness of impact evaluation. However, it is also recognized that sound impact studies are costly, especially in terms of staff time, and cannot be done for every technology or intervention. WorldVeg therefore uses the following criteria to prioritize interventions for impact evaluation:

1. **Innovative:** Interventions that are testing a new, promising approach
2. **Replicability:** Interventions that can be scaled up or applied in other countries
3. **Strategic relevance:** Interventions closely related to the centre's mission and strategic plan
4. **Lack of evidence:** Interventions for which little is known about impact, globally or locally
5. **Influential:** Impact studies with a high potential to inform a policy debate.

These criteria are based on similar criteria developed by USAID (2011). Interventions that meet more of these criteria are prioritized over those that meet fewer of them. The WorldVeg experience shows that the strategic use of impact evaluation can help projects and programmes in multiple ways to strengthen performance and increase accountability.

ICIMOD: Learning from the evolution of the centre's M&E system

Workshop participants agreed that ICIMOD had gone furthest in the development of its M&E system. Farid Ahmad, the head of ICIMOD's Strategic Planning and M&E unit, shared an account of how the evolution happened and the main drivers and success factors.

Prior to 2004, ICIMOD had a project-centric M&E system catering to individual donor requirements. Reporting was largely at the activity level. ICIMOD had a strategic plan agreed upon by the ICIMOD Board, but projects were not reporting progress against it. A newly formed Planning and M&E (PME) unit began by providing a service to projects in mapping their progress against ICIMOD indicators using data from their reports to donors. The unit compiled an annual report of ICIMOD outcomes against the strategic plan which was updated annually. The ICIMOD Board appreciated the report because it gave them a better idea of overall centre performance. The success of the report gave the unit leverage to persuade projects and initiatives to also plan against ICIMOD-institutional level, indicators as a matter of course. At the same time, the unit started offering help in developing scaling strategies.

In 2007, a new Director General began a change management process that resulted in the PME unit moving from within a research programme to becoming an independent unit reporting to ICIMOD's Director General. The unit was renamed the Strategic Planning, Monitoring and Evaluation (SPM&E) unit and given a formal budget, and the unit leader became a member of the ICIMOD Leadership and Management Team. These changes made it easier for the unit to persuade programmes to comply with mandated performance management procedures laid out in the M&E policy.

In 2012, ICIMOD started to put more emphasis on learning within initiatives and programmes through the piloting of participatory impact pathways analysis (PIPA) to develop initiative and programme theories of change. From this, the centre found that bringing key stakeholders together to collectively think through how an initiative or programme will achieve impact leads to a better design and greater ownership. ICIMOD now asks donors to include a six-month inception period to allow for this process. Since 2016, SPM&E has prioritized revisiting and learning from ToCs developed during inception, so as to make midterm course corrections based on what is starting to happen on the ground.

Key learnings

M&E planning was centralized at ICIMOD by first reporting against the strategic plan as a precursor to planning new initiatives to deliver against Centre-level performance indicators.

- A strategy that worked for the PME unit was to help projects with their reporting requirements as a way of building buy-in and capacity for M&E.
- Greater acceptance of PME was top-down, achieved by raising the status of the PME unit in the organization by including its head in the ICIMOD management team and having the unit report directly to the Director General.
- ICIMOD has found that developing and revisiting theory of change supports planning, monitoring, evaluation, and learning.

Icipe: Using the self-assessment tool to help write a centre-level M&E strategy

Icipe carried out a centre-wide self-assessment of its M&E system using the tool developed in the February workshop (see below). Menale Kassie, head of icipe's Social Science and Impact Assessment (SSIA), describes the exercise and what came out of it.

Icipe carried out the self-assessment as part of writing a centre-level PMEL strategy. Most of icipe's researchers and professional staff were involved in the assessment, carried out in a workshop. The purpose of the exercise was to agree upon a baseline of where staff think the centre is currently, to discuss the levels of improvement expected over five years, and to make suggestions for achieving this in the future.

Figure 5: **Icipe M&E system status as perceived by scientists**
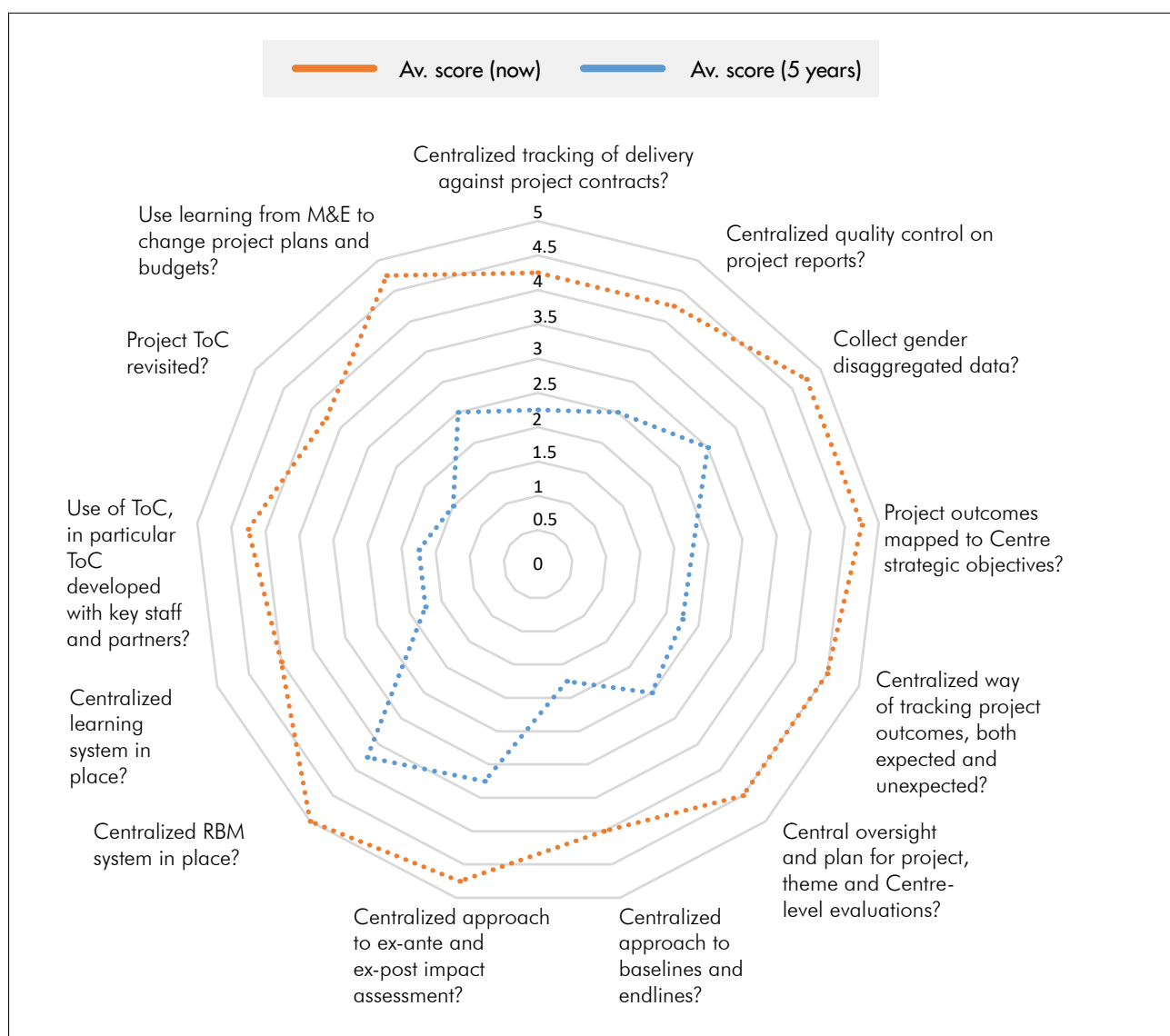
Participants went question by question, first agreeing upon what icipe has in place to respond to the question and then to decide how it rates on a scale of 1 to 5, with 5 being the highest level of attainment.

Figure 5 shows results of icipe M&E system self-assessment by scientists. Participants were generally more critical of the status quo than the SSIA unit had been in an earlier assessment. The assumption is that if biological scientists have been involved in benchmarking and specifying expected improvements, then they will be more willing to help than if the SSIA unit tells them what the problems are and what they are expected to do.

The main agreement reached was that icipe needs a set of centre-level indicators, corresponding to its main impact pathways, against which projects can plan and report, supported by the SSIA unit. Participants worked on these indicators on the day following workshop.

IFDC: Introducing Results Based Management (RBM) and strengthening MEL

Latha Nagarajan, senior economist and monitoring, evaluation, learning and sharing (MELS) specialist, described the progress made at IFDC.

Since 2016, IFDC has been developing a results-based management system on the recommendation of two external reviews. A full-time senior specialist for monitoring, evaluation, learning, and sharing has been appointed to design and implement an institution-wide MEL system. A common set of indicators has been identified for projects

to report against and a systematic data collection protocol is being developed. IFDC has also been strengthening its MEL function in support of results-based management by instilling an organization-wide culture that values and carries out continuous monitoring; cultivates a desire to learn from actions – success and failures; enables staff to capture lessons, organization-wide, and over time; and improves project functioning through timely feedback to inform course corrections. This helps the RBM system meet both accountability and learning requirements, that is, to show results, understand how they came about, and use that understanding to make IFDC more effective.

To support MEL, IFDC has been involved in building a cloud-based platform, called the Dev Results platform, to store, analyse, and visualize data to support real-time learning and adaptive management. The goal is that the platform will allow for continuous shared knowledge and learning among project and programme staff and stakeholders. To this end, the M&E function is working closely with communications and the outreach and training departments. The data management platform will meet International Aid Transparency Initiative (IATI) reporting standards.

Part 3: Key Learning and Next Steps for AIRCA Centres M&E

Key learnings and conclusions from the workshop and the writing of this paper are as follows

- AIRCA centres should aim for a centralized planning, M&E, and learning system that supports accountability and learning.
- Achieving a centralized M&E system takes time and a staged process is needed. M&E can be costly and care needs to be taken to keep these costs commensurate with the stage where the centre is.
- The trajectory that the AIRCA centres covered in this paper begins with project-level M&E that responds to respective donor requirements to be accountable for funding received. The next step is centralized reporting against a centre-wide strategic and/or operational plan followed by requiring new projects and programmes to contribute to the strategy. Key to this step is a small set of centre-level outcome indicators to which projects and programmes are expected to contribute. Another success factor is a close working relationship between the centre's M&E team and senior management.
- Institutionalizing collective planning and learning as part of M&E requires building staff capacity and motivation to engage with M&E. This requires time, clear communication, and adequate resources.
- Developing and revisiting theories of change has been used successfully by ICIMOD to strengthen and broaden planning and learning. Other centres such as WorldVeg put a greater emphasis on learning through impact evaluation. Regular centre-wide meetings can be helpful to recognize and capture lessons learned.
- Icipe has found that asking its researchers and staff to evaluate its M&E system, by using the self-assessment developed in this paper, worked to build a common understanding and benchmark the current status of its M&E and a shared aspiration for its future development.
- Complexity-aware M&E systems need to be able to recognize unexpected positive and negative outcomes and feedback effects and use this to adapt their planning and implementation.
- The need for and type of M&E systems depends on the type of research conducted. For example, basic research on plants and pathogens may not have an immediate impact on people's lives and concepts of emergence and feedback loops are therefore less relevant.
- There is often more scope for learning and flexibility in moving from one project to the next within programmes than within individual projects, particularly if projects have a short lifespan. Hence complexity-aware M&E systems are more useful at programme or centre levels.
- Finally, the process of writing this paper has strengthened our community of practice through an interchange of ideas and good practice.

References

Ahmad, T., Ahmad, F., Partap, U., & Ahmad, S. (2017). Impact of Apiculture on the Household Income of Rural Poor in Mountains of Chitral District in Pakistan. Journal of Social Sciences (COES&RJ-JSS). https://doi.org/10.25255/jss.2017.6.3.518.531

Argyris, C. (1977). Double loop learning in organizations. *Harvard Business Review*, September.

Axelrod, R.M. & Cohen, M.D. (2000). *Harnessing complexity.* Basic Books, New York.

Danielsen, S., Alawy, A., Ali, I., Romney, D., & Williams, F. (2015). Plantwise Strategy for Monitoring, Evaluation and Social Research 2015–2020. Wallingford, Oxon: CAB International.

Douthwaite, B., Mur, R., Audouin, S., Wopereis, M., Hellin, J., Saley Moussa, A., Bouyer, J. (2017). Agricultural research for development to intervene effectively in complex systems and the implications for research organizations (KIT Working Paper No. 12). Royal Tropical Institute.

Gallagher, R., Appenzeller, T., & Normile, D. (1999). Beyond reductionism. *Science, 284*(5411), 79.

Gladwell, M. (2006). *The tipping point: How little things can make a big difference.* Little, Brown, New York.

Goldstein, J. (1999). Emergence as a construct: History and issues. *Emergence, 1*(1), 49–72.

Klerkx, L., van Mierlo, B., & Leeuwis, C. (2012). Evolution of systems approaches to agricultural innovation: concepts, analysis and interventions. In *Farming systems research into the 21st century: The new dynamic* (pp. 457–483). Springer, New York.

Schreinemachers, P., Bhattarai, D. R., Subedi, G. D., Acharya, T. P., Chen, H., Yang, R., … Mecozzi, M. (2017). Impact of school gardens in Nepal: a cluster randomised controlled trial. Journal of Development Effectiveness, 9(3), 329–343. https://doi.org/10.1080/19439342.2017.1311356

Schreinemachers, P., Rai, B.B., Dorji, D., Chen, H.P., Dukpa, T., Thinley, N., Sherpa, P.L., & Yang, R.Y. (2017b). School gardening in Bhutan: Evaluating outcomes and impact. *Food Security, 9*, 635–648.

Schreinemachers, P., Rao, K.P.C., Easdown, W., Hanson, P., & Kumar, S. (2017c). The contribution of international vegetable breeding to private seed companies in India. *Genetic Resources and Crop Evolution, 64,* 1037–1049.

Schreinemachers, P., Sequeros, T., & Lukumay, P.J. (2017d). International research on vegetable improvement in East and Southern Africa: Adoption, impact and returns. *Agricultural Economics.* 48(6), 707 - 717

Shah, G. M., Karki Nepal, A., Rasul, G., & Ahmad, F. (2018). Value chain development of bay leaf in Nepal: an impact assessment. Journal of Development Effectiveness, 10(2), 179–196. https://doi.org/10.1080/19439342.2018.1438494

Shah, G.-M., Khadka, M. S., Ahmad, F., Budhathoki, N., & Shrestha, A. J. (2017). Assessment of Himalayan Nettle (Girardinia diversifolia) Value Chain Development Interventions: Evidences from Rural Households in the Far Western Nepal. Journal of Agricultural Science. https://doi.org/10.5539/jas.v9n5p19

Turner, M. (2016). Utilization of tomato and pepper germplasm from the World Vegetable Center by private and public sector breeders in South-East Asia. Shanhua, Taiwan: World Vegetable Center.

USAID. (2011). Feed the Future Impact Evaluation Guidance, Feed the Future M&E Guidance Series (Vol. 4). Washington, D.C.: Author.

Van Mierlo, B., Arkesteijn, M., & Leeuwis, C. (2010). Enhancing the reflexivity of system innovation projects with system analyses. *American Journal of Evaluation, 31*(2), 143–161.

Westley, F., Zimmerman, B., & Patton, M. (2009). *Getting to maybe: How the world is changed.* Toronto: Vintage Canada.