

**COOPERATIVE RESEARCH CENTRE FOR FORESTRY
THIRD YEAR REVIEW – NOVEMBER 2008**

INTRODUCTION:

Timetable

The 3rd Year Review Panel met and held interviews from 5 to 7 November 2008 in Launceston, coinciding with the Annual Meeting of the Cooperative Research Centre for Forestry (CRCF) and the meetings of the Research Advisory Committee (RAC). A timetable was organised by the CRCF and additional discussions were arranged as required by the Panel (Appendix 1- Timetable).

Panel membership

The independent Review Panel comprised:

Professor Roger Sands (Chair)
Professor Emeritus of Forestry
College of Engineering
New Zealand School of Forestry
University of Canterbury
Private Bag 4800, Christchurch 8140
New Zealand
Email: raesands@bigpond.com

Professor Geoff Wilson AM
Geoff Wilson Consulting
33 Highett Road
Highett Vic 3216
Australia
Email: gvh.wilson@gmail.com

Dr Nuno Borralho
Centro de Estudos Florestais
Universidade Técnica de Lisboa
Tapada da Ajuda
1349-017 Lisboa
Portugal
Email: nunoborralho@sapo.pt

David Lyons (Secretary)
92 Princes Street
Sandy Bay Tas 7005
Australia
Email: David.Lyons@internode.on.net

Panel members were independent of the CRCF and bound by confidentiality agreements.

Terms of Reference and Methodology

The terms of the reference for the Review (Appendix 2) were prepared by the CRCF based largely on information provided in the document *Cooperative Research Centres Program Third Year Review Guidelines for CRCs, May 2008, Department of Innovation, Industry, Science and Research*.

An overview submission containing background information, reports and other documents was compiled by the CRCF and sent to the Panel in advance of the Review (Appendix 3 - Documents List). Included in the documentation was a draft economic impact assessment of selected investments of the CRCF prepared by Agtrans Research.

The Department of Innovation, Industry, Science and Research (DIISR) also prepared a briefing document for the Review Panel, and Mark Johnson and Andrew Cook of the Department attended as observers on days one and two of the interviews.

The Panel interviewed the Chairman of the Board, the Board, the CEO, end-user representatives, the Business Manager, the Industry Engagement Manager, research Program leaders, research providers, postgraduate students and individual scientists (see Appendix 1). All members of the CRCF community, including students, were invited to make email submissions to the Review Panel.

The CRCF made all administrative arrangements for the Panel and met the associated costs.

The Research Advisory Committee (RAC, also known as the Research Advisory Panel) met at the same time as the Third Year Review Panel. This committee looked at the research Programs in detail. Their report (summary given as Appendix 4) comprehensively deals with section D of the generic terms of reference for the third year review. The Review Panel substantially agrees with this report and requests this report be considered alongside the third year review.

The draft review report was prepared following the interviews and was finalised following receipt of the report of the RAC.

ABBREVIATIONS

AICD	Australian Institute of Company Directors
AIM	Australian Institute of Management
CRC	Cooperative Research Centre
CRCF	Cooperative Research Centre for Forestry
C&U	Commercialisation and Utilisation
CEO	Chief Executive Officer
DIISR	Department of Innovation, Industry, Science and Research
EIA	Environmental Impact Assessment
IP	Intellectual Property
MYOB	Mind Your Own Business - Accounting Software
POP	Project Operating Plans
RAC	Research Advisory Committee
R&D	Research and Development

RECOMMENDATIONS

Recommendation (R1): *The Panel recommends that a discretionary fund be established to assist the CEO to respond to changing circumstances.*

Recommendation (R2): *The Panel recommends that membership of Program Coordinating Committees be reviewed to ensure that pathways to adoption are best represented.*

Recommendation (R3): *The Panel recommends that the CRCF should encourage industry to form a peak body to represent forest operations research across the sector.*

Recommendation (R4): *The Panel recommends that the CRCF take advantage of the flexibility permitted under CRC Program procedures for Program changes whenever it feels this to be justified and desirable.*

Recommendation (R5): *The Panel recommends that the CRCF investigates the possibility for initiating additional new areas of research, particularly those in forestry related areas in carbon and water, either through the gaining of new funding sources or by adjustments in its present research portfolios.*

Recommendation (R6): *The Panel commends the CRCF for its strategic approach to planning for the continuation of its partnerships and activities after wind up of the present structure and recommends that the CRC Committee also considers the relevant system wide issues.*

Recommendation (R7): *The Panel recommends that Project Operating Plans have well defined procedures for delivering results and promoting adoption.*

Recommendation (R8): *The Panel recommends that more rigorous ways of measuring the success of adoption be considered.*

Recommendation (R9): *The Panel recommends that expectations across Programs about the quantity and quality of the deliverables should be better specified. In particular the type and commercial potential (and for whom) of the IP generated should be clarified.*

Recommendation (R10): *The Panel recommends that a more detailed description of the commercialization and adoption of research should be drafted. This should include what should be the role of industry partners in implementing IP and how to monitor the expected changes in practices and impacts. Given the importance attributed to Education and Training in the CRCF, the changes in rate of employment of highly skilled forest professionals by industry should be specially monitored.*

Recommendation (R11): *The Panel recommends that the CRCF consider mechanisms to ensure that there is an on-going capacity to train end-users in the operational use of the model CABALA.*

Recommendation (R12): *The Panel recommends that the CRCF consider alternative strategies to meet their contractual research commitments should the planned recruitment of postgraduates not eventuate or be delayed.*

A. GENERAL

Performance (A1)

The Panel considers that the CRCF is performing very well with many parts of the research program being excellent by international standards. The Board is experienced, of high quality and with a strategic focus. The CEO is excellent. The CRCF is on track to delivering its contracted milestones and outputs. Some Projects are ahead of schedule. The documentation provided to the committee was sometimes general and vague, especially on the paths to adoption of the CRCF's research. However, the actual research was specific and focussed. Progress to date strongly suggests the CRCF will achieve its projected goals. Program 3 started late but is now on track. The tropical Program 2.5 has only just commenced and it is too early to make informed comment. Projects are locked into 7 year horizons which the Panel considered inflexible. However, almost all CRCF staff interviewed considered this a benefit rather than a problem. Even so, lack of flexibility is a constraint that needs to be managed. The CEO does not have a discretionary fund to meet emerging challenges.

Recommendation (R1): *The Panel recommends that a discretionary fund be established to assist the CEO to respond to changing circumstances.*

This is the third funding cycle of the forestry CRC and there has been a transition from a cool temperate Tasmanian focus towards a national focus. The current CRCF has inherited strong cool-temperate ties across southern Australia but it is gratifying to see that Queensland and NSW have joined so that tropical and subtropical interests are represented.

Strategic direction and alignment (A2)

The strategic direction and alignment with current company end-users generally is very good. End-users were both pleased and involved but end-user expectations were often non-specific. This may well be the nature of forestry research where outputs are largely the incremental sharing of information. The industrial end-users interviewed by the Panel were R&D personnel who were not necessarily the appropriate end-users with high levels of influence within the companies. The most difficult part of the pathway to adoption usually lies within the company. The CRCF cannot influence this directly but should attempt to understand company pathways to adoption and respond accordingly. As far as possible the full pathway to adoption should be represented on Program Coordinating Committees and in some instances this needs a review of membership.

Commendation: *The Panel commends the CRCF on the appointment of an Industry Engagement Manager. This is a very positive step towards understanding, defining pathways to, and achieving adoption.*

Recommendation (R2): *The Panel recommends that membership of Program Coordinating Committees be reviewed to ensure that pathways to adoption are best represented.*

Value-adding (A3)

The main measure of value-adding to business was that end-users were content and that the businesses had every intention of continuing funding. It was difficult to get information more specific than this. Companies are unlikely to adopt unless it adds value. There were some well defined and immediate adoptions, some that were likely but a little down the track and some that were more distant and less certain. End-users saw the CRCF as being a community of scientists that had credibility and public respect and therefore could be used as a marketing tool as well as a reservoir of scientific expertise. End-users saw a major output of the CRCF as provision of postgraduates some of which would flow to the companies. Prior CRCFs have confirmed this. Program 3 (operations) has been very enthusiastically supported by industrial end-users and pathways to adoption and value-adding are well demonstrated. However, the industrial end-users are getting more than a fair deal here. Industrial end-users provide a minority of the funding to the CRCF and often reluctantly. The nature of Program 3 research is very operational. There is no doubt that the CRCF has given this Program a good start and focus but, beyond the life of the CRCF, research in this area should be funded, or at least coordinated, by industry. The CRCF cannot make this happen but it can provide encouragement.

Recommendation (R3): *The Panel recommends that the CRC should encourage industry to form a peak body to represent forest operations research across the sector.*

B. GOVERNANCE, MANAGEMENT AND COLLABORATION

Governance

The CRCF has been established as an incorporated company, the CRC for Forestry Limited. The non-executive members of the Board have high levels of relevant experience and include a senior research provider and the others all have extensive industry backgrounds. There are two executive members, the CEO and the Business Manager. A majority of the members hold memberships of the AICD or the AIM. Some of the research providers interviewed compared this CRCF favourably with others in which they were partners in terms of its success and productive partnerships, attributing much of the high performance of the CRCF to the establishment of a Board chosen for its mix of skills rather than one preoccupied with representation.

The Board met on five occasions in 2007-08 and the attendances at these meetings, and the main committees of the Board was close to 100%. The Board has four main advisory committees – Remuneration and Nominations, Compliance, Commercialisation and IP Management, and Strategic Policy. From its probes across all levels of the CRC, and its examination of documentation, the Panel members believe that the Board, and its committees, are operating well with high standards of governance and responsibility.

The Board expressed a high level of confidence in the CEO and satisfaction in his performance. This view was also evident from our Panel's meetings with managers and other members of staff. The Board has a Remuneration Committee and carries out an annual appraisal of the performance of the CEO. Both the Board and the CEO have a strong outcomes focus and our meetings with students, research staff and managers indicated a very high level of alignment with the objectives of the CRCF across all of its components. The Panel was convinced that the Board had a professional approach to risk analysis and to issues of compliance.

Management

As above there is an effective and highly focussed Board and CEO. The management structure and management staff are also effective and well supported by an appropriate committee structure, including the main committees of the Board. A pleasing new initiative is the appointment of an Industry Engagement Manager who is obviously improving some already high levels of industry and end-user engagement across the CRCF and its portfolio of Programs.

Finance and financial reporting

The CRCF uses a financial management system based on MYOB accounting software. A yearly budget *proforma* is used, and recent changes have allowed the budget to be specified down to a greater level of detail. This has enabled a high standard of quarterly expenditure reports to be provided on a cost centre basis to managers and researchers. In-kind contributions are collated from institutional returns on an annual basis. These are cross checked as required with Program and Project managers in relation to achievement of milestones.

The Board has decided to increase funding for unforeseen requirements and for the improved funding of pathways to adoption.

Collaboration

From its discussions with end-users and providers, and its observations during the annual conference of the CRCF, the Panel has concluded that there are excellent levels of collaboration that reflect the good relationships across the CRCF.

Monitoring of research and collaboration

Each of the four Programs has a Program Coordinating Committee, each chaired by an industry end-user member. There is also a Research Advisory Committee that monitors the research and its outcomes and considers the research planning. The state, progress and outcomes of each research Project are well summarised in the annual reports of the CRCF. With the recent appointment of an Industry Engagement Manager an increased effort on the monitoring of adoption and on the pursuit of industry opportunities is occurring.

The Panel noted that, at present, all of the research Projects are planned to operate over the full seven year tenure of the CRC and that some members of the CRCF expressed a belief that this was made necessary by the application process to the Commonwealth. There appeared to be potential for problems arising from the inflexibility inherent in these full term structures and in the potential for the Programs to act as research silos. The Panel was reassured that much of the

research activities occurred across the Programs and noted a significant number of examples of this. It also noted that the new Industry Engagement Manager was active in pursuing the outcomes for end-users from cross Program research.

The Panel wishes to draw the attention of the CRC to the high levels of flexibility available within the CRC program. A portfolio approach to Projects of varying length throughout the life of the CRCF would provide greater flexibility, and enable the allocation of resources to Projects in response to changes in end-user priorities. If such changes are major with significant shifts in resource allocations, or involve changes in agreed milestones, they should be discussed with the Commonwealth and contract variations made as required. The Panel recognises that there are difficult issues in varying the allocation of resources, particularly those from partners and research providers, when all of the existing Programs are operating well. One approach would be to attract new sources of funding and possibly new partners to facilitate new areas such as carbon and water. It is now obvious that issues of forestry with carbon and water have become of critical national importance and that there are considerable new opportunities for new sources of public and private support. The Panel notes recent moves to add more water related areas within Program 4.

Recommendation (R4): *The Panel recommends that the CRCF take advantage of the flexibility permitted under the CRC Program procedures for Program changes whenever it feels this to be justified and desirable.*

Recommendation (R5): *The Panel recommends that the CRCF investigates the possibility for initiating additional new areas of research, particularly those in forestry related areas in carbon and water, either through the gaining of new funding sources or by adjustments in its present research portfolios.*

Economic Impact Assessment

The Panel notes the efforts put into the Economic Impact Assessment (EIA) by the CRCF and its consultants, Agrans Research. The resulting report is very detailed and well considered for a subset of seven of the research Projects that were investigated. These Projects covered 46% of total investment of the CRCF in all of its Projects but a smaller percentage of the total number of Projects. The Panel also noted that the depth of analysis undertaken was far more extensive than envisaged by the CRCF Committee when the requirement of an EIA as an element of the third year review process was initiated. As a result of the effort involved in the CRCF's EIA, there were not sufficient resources to cover a larger area of the CRCF's Projects and the Panel is left with an indication of the effectiveness of only some of the CRCF's Projects. The Panel feels that the CRC Committee needs to give greater guidance on this to ensure more breadth and less depth of analysis in future reviews by CRC's and their consultants. However the CEO indicated to the Panel that the emphasis on depth for a subset of the Projects was intended to give him and the Board useful, more detailed information in critical areas and that they had found the exercise and the information to be most useful.

In the areas considered the expected outcomes were determined from detailed consultation with the Project leaders and then evaluated by the consultants. The

expected benefit to cost ratios for the seven Projects ranged for 0.6 to 38 with an average of 10.

Wind-up and exit strategy

Members of the Board and several others raised their concern over wind-up issues and the approaches of the CRCF to this. There is a determination for the CRCF to continue its operations after completion of the seven year period with a preference for the retention of the title 'CRC', even if no funds are provided by the CRC program. This wish is linked to the role of the CRCF as the sole industry wide partnership between providers and end-users in forestry. Two problems were mentioned. The first was the problem of 'time out' whereby it will become more difficult to recruit postgraduate students once the remaining tenure of the CRCF becomes less than the typical completion time. The other is the bidding for further grant or industry funding when the CRCF is scheduled to close before completion of the normal funding periods for new areas of support. The new funds could be strategic to enable a transition after wind up of the present CRCF or to facilitate entry to new initiatives such as carbon or water. The CRCF will make financial provision to ensure that students receiving CRC Scholarship support are funded for normal completion times after wind up of the CRCF.

***Recommendation (R6):** The Panel commends the CRCF for its strategic approach to planning for the continuation of its partnerships and activities after wind up of the present structure and recommends that the CRC Committee also considers the relevant system wide issues.*

Specific items in governance, management and collaboration

B1 The Panel was impressed with the effectiveness of the CRCF's governance, management and collaborative arrangements in maximising the value-add of collaboration and achieving the intended results for the end-users. There was obviously a high level of end-user satisfaction and participation in the planning and operation of the research Projects.

B2 The Panel was impressed with the effectiveness of budget planning and resource allocation to individual activities and Projects though it generally felt that some greater flexibility in the planning of these over the lifetime of the CRCF was needed.

B3 As above there are few threats to the delivery of the proposed outcomes but the Panel believes that a more flexible approach to the portfolio of Projects would offer enhanced outcomes and that the CRCF is well placed to take advantage of the increased national significance of research in carbon and water.

B4 The CRCF has an independent Research Advisory Committee (with which the Panel met) and each research Program has an active Program Coordination Committee that is dominated by industry end-users; these arrangements are working well and ensure high levels in the monitoring and management of the research and end utilisation. There have been no significant shortfalls in meeting

contractual obligations, indeed the total cash and in-kind contributions of the partners are well ahead of the planning figures.

C. COMMERCIALISATION – UTILISATION

The Panel considered the effectiveness of strategies (C1), appropriateness of pathways to adoption (C2), progress in commercialisation (C3) and progress in utilisation (C4).

General

The key elements used to analyze the structure, path to adoption and progress of commercialisation and utilisation outcomes were the Annual Reports, the Project Agreements and the Project Operating Plans, together with the various interviews, especially those with the Industry Stakeholders, the Program Leaders, and the Industry Engagement Manager.

The Project Operating Plans (POP) for each Project describe deliverables, expected delivery dates, and adoption strategies (process, target audience and resources).

A common view shared by all those interviewed, and reflected in the Participant's Agreement, was that (1) the *specific* nature of the CRCF outcomes was mainly prospective, aiming to build a better understanding of processes rather than developing specific technical solutions or technology, and (2) the CRCF deals with systems (such as forest plantations and native forest ecosystems) which are by nature very complex and long-term. These characteristics lead to obvious difficulties in having detailed outputs. Given the relatively long duration of all the Projects (7 years), it is appropriate that deliverables are loosely defined, to allow for necessary changes or adjustments with time as research progresses and new results or priorities emerge.

Research Providers and Industry agreed that commercialisation (in its narrow sense of developing specific technology) was neither the most likely nor the most desirable path to follow in most Projects. Instead, the communication of results (via documents or events) with subsequent adoption of improvement of practices was considered the most likely strategy. Postgraduate students are required to present their research in theses and peer-reviewed journals. This constrains commercialisation activities to some extent.

It is still too early to expect much commercialisation and utilisation of results after just 3 years. So far, the CRCF has put in place a good set of Intellectual Property (IP) policies and management guidelines (IP Policy and Property Manual), and established an IP register. Human and financial resources have been allocated to manage forthcoming commercialisation and utilisation opportunities.

The effectiveness and appropriateness of the chosen strategies for Commercialisation and Utilisation

Project Operational Plans are vague on plans to deliver results. These limitations have been acknowledged by the Commercialisation and Intellectual Property Management Committee and steps are being made to remedy this.

***Recommendation (R7):** The Panel recommends that Project Operating Plans have well defined procedures for delivering results and promoting adoption.*

Sometimes simple communication of results is the best strategy. For example, Program 4's outputs are mostly about understanding the impact of different management options on water, biodiversity, social values and carbon in forested landscapes. Peer-reviewed papers and technical reports should constitute an effective and credible source of information for the public, forest companies and other players in the forest debate. The success here would mainly depend on having an appropriate communication strategy capable of reaching key players effectively and accurately.

In the other Programs, the situation is different. Program 1 aims to develop mainly tools (monitoring, measuring and modeling) for inventory and forest managers. Program 2 aims to develop rules and procedures for sampling and selecting better wood properties. Program 3 aims to develop better harvesting and transport schemes. For these Programs, deliverables explicitly include things like new instrumentation (or instructions to use existing ones), toolboxes or software tools (as a simple way to incorporate existing or new models). In some cases, expected outputs include confidential information to companies. Few examples of possible patents are expected.

The CRCF accepts responsibility to follow research as far as possible through to adoption. Improving knowledge through papers and workshops is fundamental in improving practices and competitive advantage of CRCF industry partners but unless there are mechanisms or a culture set in place to change such practices as a result of new information, it is hard to measure and demonstrate just exactly how much better off end-users would be as a result of new knowledge generated by the CRCF. The degree of adoption will depend not so much on the success of researchers to develop new knowledge but on the end-user's capacity to transform them in new technologies and practices. One specific concern raised was that the industry people involved with the CRC are R&D staff from these companies who also have communication and implementation issues to manage in their own organizations. Part of the success in commercialisation and utilisation is outside of the direct control of the CRCF but not necessarily outside of its influence (see Recommendation R2).

It was not possible to analyze how each industry stakeholder was planning to adopt the various research outcomes expected. However, all partners were highly motivated and keen to adopt results. Industry partners shared the view that conversion of new knowledge into practices or processes would need to be on a case by case basis. However, a clear strategy of adoption requires more formal "engineering" of the production system which is not standard culture in the

forestry sector. Without this system being defined, it is not easy to design and implement research outputs and harder still to measure their impact. It is a concern that quantification of the success of adoption of research outcomes was poorly defined in Project Agreements. For example, a typical indicator of adoption was “hectares/year over which technology is used”. This however does not detail how many hectares until when, how the expected benefit from this will be measured and what are the expectations (such as a reduction in costs or an improvement in productivity).

Recommendation (R8): *The Panel recommends that more rigorous ways of measuring the success of adoption be considered.*

It was apparent from interviews and documentation that all industry stakeholders were very keen and committed to change their practices and procedures if and when the CRCF develops new promising results. Probably the more the industry will pay for the research the more it will make sure it adopts the R&D results, a stimulus to the CRC concept.

Spin-offs and R&D Service Providers

Industry found some expected outcomes to be complex and difficult to apply operationally. One example was the model CABALA (seen as important and relevant but hard to use) but examples can be taken from most Projects. Perhaps the CRCF could develop an extension or consultancy role to ensure technology is applied effectively by end-users. Ultimately this could create a business opportunity for Research Providers or consultancy spin-off companies in the future.

Progress made in Commercialization & Utilization and Communication

Given all Projects have a 7 year lifespan, the most important activities or deliverables are expected to come at later stages. Until now, most activities listed are conferences or workshops, various web initiatives (e.g. BioBuzz and newsletters – excellent by the way), and the *Highlight and Achievements* booklet. The Panel wondered whether there is some objective measure of public impact of such publications. There is also an impressive list of peer-reviewed publications coming out of most Programs as well. No commercialisable IP is yet available, although this is expected in the future.

IP Management Issues

IP policy and management issues are thoroughly covered in the Manual. This should ensure the process to protect IP and benefits going to IP owners will be fair, smooth and straightforward. At year 3 the IP Register is still short in items and incomplete, but the strategy seems appropriate and useful. Few details were given at the Program level about IP expectations, namely patents or copyrighted software, two good indicators of efforts in commercialization. The best example of IP items are the Peer Reviews or Confidential Reports and Theses, an important output from most Projects. There are some obvious imbalances between the various Programs that need to be addressed.

Recommendation (R9): *The panel recommends that expectations across programs about the quantity and quality of the deliverables should be better specified. In particular the type and commercial potential (and for whom) of the IP generated should be clarified.*

The amount of IP generated is a good indicator of the CRCF performance. But so should be its quality. Different Programs have different commercialization potential and therefore likelihood of generating IP. Ideally each Program should have a system of values and expectations between the various IP types. Are patents as valuable an output as a paper or a technical report? Some expectation of the number and relative proportion of papers, theses and commercialized IP should be set at the CRC level, with some specialization accepted at the Program level, with some Programs delivering a lot of papers but little commercial outputs and others being the opposite.

Recommendation (R10): *The Panel recommends that a more detailed description of the commercialization and adoption of research should be drafted. This should include what should be the role of industry partners in implementing IP and how to monitor the expected changes in practices and impacts. Given the importance attributed to Education and Training in the CRCF, the changes in rate of employment of highly skilled forest professionals by industry should be specially monitored.*

Final Comments

The CRCF is well on target to deliver the expected outcomes, according to the plans, despite some delays in a number of Projects. There was strong involvement and agreement between Research Providers and Industry Partners on the best way to develop and deploy research results and this is a huge strength of the Centre.

Strategies to communicate the research (via publications and events) are very effective as well as the ability to pass on to the public the image of a responsible, credible, independent and competent CRC.

The next year or two will be crucial to have fully developed specific plans for *commercialization* and *adoption* of research results by industry partners. This will need to be done on a case by case basis, since each Project has a specific set of end-users and scope. The CRCF is well positioned and resourced to take the necessary measures and develop the best plans for C&U. It is also well set to look into and protect any IP generated. Industry partners will have a major responsibility in making technology transfer a success. The current involvement and collaboration between industry and research is excellent. But ultimately, the effectiveness of research will require a serious look from industry at how to “re-engineer” their internal production processes and have their top management (not only their R&D people) totally committed to adopt new technology and practices.

D. RESEARCH

The quality and relevance of research was reviewed by the CRCF Research Advisory Committee (RAC) at the same time as this third year review. The RAC is comprised of Dr David Whitehead (Program 1), Dr Steve Verryn (Program2), Dr Loren Kellogg (Program 3) and Dr Sadanandan Nambiar (Program 4). The Committee is assisted by the CRCF visitor, Dr Glen Kile. This is a committee of international and independent experts who have the reputation within the CRCF of being fearless and uncompromising. Our review Panel considered that the summary of the RAC report (Appendix 4) should be tabled because it is focussed specifically on research. The Review Panel endorses this report as accurate and consistent with what we found at interviews and in the documentation provided to the Panel. We differ in one respect. The RAC recommends, emphatically, that the current research Programs should not be changed. The Review Panel considered this unnecessarily restrictive and indeed made a contrary recommendation (R5). It may well be the case that the research Programs will remain unchanged because they have been well considered and designed over a 7-year timeline. However the Panel considered there is no point in closing off options.

The research Programs generally are of high quality with some research being excellent by the highest international standards. The RAC gives examples of the process-based model CABALA, the development of candidate-based genes for tree breeding, and parts of the Projects on biodiversity and communities. Program 3 started late because of recruiting difficulties but is now on track and performing well. The Queensland research (RP2.5) has only just started and it is too early to judge its merits. The water Projects embedded in Programs 1 and 4 have been modified to incorporate current issues of water scarcity and carbon sequestration. Additional funding has been allocated.

Except as outlined above, all Programs and Projects are consistent with the CRCF's overall strategy and its contractual commitments. There is no need that any be discontinued, refocused or reviewed again. The RAC considers there are potential mismatches between milestone/project objectives and available resources that need to be considered and the Panel agrees with this.

Specifically

D1: The progress made in developing new products, processes or services has been detailed in Section C. Satisfactory progress has been made.

D2: There are two scientific and technical issues that should be addressed. The model CABALA is complex and there is no program or plan to provide training to end-users to understand it and use it at the operational level.

Recommendation (R11): *The Panel recommends that the CRCF considers mechanisms to ensure that there is an on-going capacity to train end-users in the operational use of the model CABALA.*

The research Programs depend largely on postgraduates and there have been difficulties in recruitment. The CRCF should consider alternative strategies to meet their contractual research commitments should recruitment difficulties persist.

Recommendation (R12): *The Panel recommends that the CRCF consider alternative strategies to meet their contractual research commitments should the planned recruitment of postgraduates not eventuate or be delayed.*

D3: The leaders of the research Programs are of high quality. The research Programs are well integrated in terms of the CRCF's overall strategy.

D4. Research activity is high. There is an atmosphere of enthusiasm over all Programs. Patenting, publications and their appropriateness in transferring knowledge to end-users have been discussed in detail in Section C.

D5. The CRCF research varies from fundamental through to applied-operational. The relevant peers will vary over this range. The number of publications in quality refereed journals is good (although unevenly distributed across Programs). At the operational end of the range the appropriate peers are probably the end-users and they have given enthusiastic support. There are several scientists in the CRCF who have excellent international reputations.

D6. Research collaboration should be inevitable in the CRC model. There are examples of collaboration between Programs, between research providers within the CRC and with Research Providers outside of the CRC. Collaboration of researchers with end-users is endemic across all Programs. For example, there is collaboration between the University of Melbourne, the University of Tasmania and companies in the development of candidate genes for tree breeding. On the other hand international collaboration could be improved. South America and South Africa have a longer history of management of eucalypt plantations than does Australia and their research programs are more mature. Collaboration with South America and South Africa should be improved.

D7. The capability of the CRCF of meeting end-user requirements and market opportunities has been discussed in detail in Section C. In general it can do so but there are some issues that need attention. Specifically the CRCF needs to influence the adoption pathways inside the end-users environment (see recommendation R2).

E. SKILLS DEVELOPMENT

Postgraduate students

The Commonwealth agreement expects 63 higher degree research (HDR) and 10 honours students over the life of the CRCF. Currently enrolments are 87% and 60% respectively of the CRCF's goals. There has been some difficulty in attracting students but the general consensus is that the quota will be filled, although unevenly across Programs. Program 3 is most at risk due to the late start and a small pool of available and suitable postgraduates. Exit strategies will be

needed to allow students to complete after the end of the CRCF (see recommendation R6). The quality of postgraduates recruited to date is excellent and morale among the students is high. Postgraduate students considered they had special advantages being part of the CRCF and these included: broader and better supervision; involvement with industry, better prospects for future employment; and access to well-funded and well-equipped research programs. End-users saw postgraduates as future employment prospects. The postgraduate program attracted students from industry who otherwise would not have been attracted. End-users saw postgraduates as being a very important output from the CRCF. There were many industry representatives at the annual meeting who had been postgraduates in previous terms of the CRC.

Given the relatively new history of eucalypt plantations in Australia and the increasing demand for professionals in this field, the Education Program is possibly one of the most powerful and effective mechanisms of transfer of knowledge in the CRCF.

The postgraduates were invited to send confidential emails to the Panel. The responses were overwhelmingly positive. There were several complaints about the value of their scholarship and incompatibilities with other scholarships around them. It is unreasonable to criticise the CRCF for this because the value of the CRCF scholarships is towards the top of the scale and incompatibilities are a fact of university life.

Taking the above into consideration:

E1. The CRCF has high-calibre postgraduate students and high-quality broadly-based supervision spanning different research providers and including industry. The multi-disciplinary diversity of team supervision was acknowledged by both students and supervisors to be a particular strength of the CRCF. The vibrant research environment provides excellent research training but the quality and availability of formal research training courses was obscure. There are significant logistical difficulties in providing formal professional development training centrally and universities argued for a flexible and decentralised approach.

E2. Postgraduate students are intimately involved in the research across all Programs and to this extent are involved in Project planning. There are no formal roles for them in Project management or commercialisation.

E3. The CRCF is a partner in the newly created National Forestry Masters Program and CRCF staff have lectured in this program at ANU, the University of Melbourne and the University of Tasmania.

E4. Industry has strong links with the CRCF staff lecturing in the Masters courses.

E5. The CRCF has an active program of communicating results through publications, web, and workshops but the Panel is unaware of any attempt to monitor demand.

E6. The Masters courses are specifically designed for professional development of CRCF staff as well as for credit to Masters students.

CONCLUSION

The Review Panel was impressed by the quality of research being performed by the CRCF, the management structure underpinning this and the degree of interaction with end-users. The CRCF is performing extremely well and certainly justifies the investment made by the Commonwealth. The Panel does not recommend any major changes.

The Review Panel thanks the CRCF for hospitality during the Review process and particularly for the provision of the secretarial assistance of David Lyons to the Panel.

Appendix 1 – Timetable

	WEDNESDAY 5th NOVEMBER	Who
09:00-10:00	Review Panel initial meeting	Panel plus secretariat plus observers Mark Johnson, Andrew Cook (CRC Program DIISR)
10:00-11:00	Meeting with the CEO	Gordon Duff
11:00-11:10	Morning Tea	
11:10-11:35	Education Program	Peter Kanowski, Education Program Chair and Neil Davidson, Education Manager
11:35-12:00	Research Program 3 - <i>Harvesting & Operations</i>	Mark Brown, Program Manager
12:00-12:30	Visitor and Research Advisory Committee	Glen Kile (Chair and Visitor), Sadanandan Nambiar, David Whitehead, Steve Verryn, Loren Kellogg
12:30-13:30	Lunch	
13:45-14:35	Research Programs 1 & 2 - <i>Managing and Monitoring for Growth and Health & High Value Wood Resources</i>	Mark Hunt and Chris Harwood
14:35-15:15	Meeting with the Business Manager	Mark Stemm
15:15-15:45	Afternoon Tea	
15:45-16:00	Education Program & National Forestry Masters	Address to Plenary by Peter Kanowski
16:00-16:15	Address to the meeting by the Review Panel Chair	Roger Sands
16:15-17:10	Meeting with Industry Stakeholders	Steve Read (FT), Trevor Innes (FEA), Ian Dumbrell (FPCWA), Darrell Clark (Gunns), Andrew Callister (ITC), Steve Elms (HPV)
17:10-17:40	Meeting with the Board	Board, CEO and Business Manager
17:40-18:35	Research Program 4 – <i>Trees in the Landscape</i>	Brad Potts - Program Manager Don White and Jacki Schirmer - Project Leaders
18:40	Dinner, Hotel Grand Chancellor	

	THURSDAY 6th NOVEMBER	
08:00-10:15	Panel discussions and drafting	Panel plus secretariat plus observers Mark Johnson, Andrew Cook (CRC Program DIISR)
10:15-10:45	Morning Tea	
10:45-11:15	Meeting with Students	Himlal Baral (UM), Kate Taylor (Murdoch)
11:15-12:15	Meeting with Research Providers	Rod Keenan (UM), Jim Reid (UTAS), Peter Kanowski (ANU), Jerry Vanclay (SCU), Hans Drielsma (FT)
12:15-12:40	Meeting with Early Career Researcher	Luke McManus (UM), Postdoc Program 2
12:40-13:30	Lunch	
13:30-15:30	Student Poster Presentations	
15:30-16:15	Afternoon tea with students	Review Panel and students
16:15-17:30	Meeting with Industry Engagement Manager	Tom Fisk
18:30	Dinner, Mt Pleasant Showroom at Launceston CC	Transport Provided
	FRIDAY 7th NOVEMBER	
08:00-9:15	Panel discussions and drafting	Panel plus secretariat
09:15-10:00	Meeting with Chair	Kate Carnell
10:00-10:20	Morning Tea	
10:20-12:00	Panel discussions and drafting	Panel plus secretariat
11:45-12:20	Report back from Research Advisory Committee	RAP presentation to Plenary
12:20-12:30	Meeting close	
12:30-13:15	Lunch	
13.15-14:00	Meeting with the CEO	Gordon Duff
14:00-15:00	Panel discussions and drafting	Panel plus secretariat

Appendix 2 – Terms of Reference

CRC for Forestry Third Year Review Terms of Reference

The following document is based largely on information provided by the Australian Government in their document “Cooperative Research Centres Program Third Year Review Guidelines for CRCs May2008”

BACKGROUND

The Third Year Review will inform the Board of the CRC for Forestry whether the CRC has achieved to date, and is on track to achieving its goals. The review must have both a diagnostic and a strategic focus, and be a comprehensive ‘fact-finding’ assessment of the CRC’s activities and overall performance, including its governance and management arrangements. The Review must examine how the CRC’s programs and activities fit together in delivering outcomes, and recommend any changes required to the CRC’s strategic direction to better align it with the end-user environment.

The Review must, in particular:

- ascertain the extent of end-user involvement in the CRC’s activities and their views on the relevance of these activities to their research needs;
- examine the effectiveness of the CRC’s governance and management arrangements in terms of planning, decision-making and risk management;
- assess the CRC’s performance monitoring and management processes;
- identify any systemic issues including those relating to research collaboration and commercialisation;
- review the CRC’s strategies for commercialisation/utilisation, IP management and communication; and
- identify whether there are any scientific and technical issues in relation to the CRC’s research activities.

The CRC will make available to the independent panel the data and information required to undertake the review, including the results of the economic impact assessment which will be conducted by Agrans Research, and completed before 30 October 2008. The CRC will also provide the necessary contact details of CRC staff for interviewing purposes. The CRC will provide the Panel with copies of:

- the Commonwealth and Participant Agreements with all approved variations;
- annual reports for the first three years;
- First Year Visit Report; if a First Year Visit was undertaken;
- the Third Year Review guidelines and any briefings provided by DIISR for the Panel;
- the economic impact assessment outcomes; and
- any information requested by the Panel that is available to the CRC and is relevant to the scope of the review.

The CRC is responsible for the review budget and will provide the necessary administrative and secretariat support to the independent panel including facilitating travel and accommodation for the CRC annual science meeting, and other research locations deemed necessary by the panel.

The CRC will employ a 'scribe' to assist the Independent Panel to prepare its report should this be requested. The scribe will be independent of the CRC.

PROCESS

The independent panel will undertake a comprehensive review of the CRC's activities. In particular, the review must assess the CRC's performance to date and its ability to deliver the outcomes of the CRC as described in Schedule 1 of the Commonwealth Agreement.

The review will involve the following steps:

- The panel must review the effectiveness of the CRC's governance and management structure/processes and collaborative arrangements.
- The panel will meet at a mutually convenient location and interview the CRC's CEO, the Chair of the Board, research program leaders, business manager and other Specified Personnel to identify the strategies and processes in place to manage the CRC's various activities.
- The panel may, at their discretion, also visit a small number of **selected** research locations and may also interview CRC students working towards their PhD or post-doctoral researchers.
- The CRC will make participants and end-users available to the independent panel to allow the panel to assess the impact of the CRC
- The panel will review the research, utilisation and education activities being undertaken at the CRC's various locations (this does not require on site visits).
- The panel will have an opportunity to meet with the CRC for Forestry Scientific Advisory Panel, an independent advisory group that has been providing ongoing advice and constructive critique of the CRCs research program since inception. Past reports from the Scientific Advisory Panel will also be made available.
- It is anticipated that the visit of the Independent Panel should take no more than two or three working days.
- The Independent Panel may decide to stay for another day to draft their Report - this could be undertaken by the Panel members themselves or with the assistance of a scribe.

It is anticipated that the majority, if not all, of the face-to-face meetings identified above will take place during the CRC for Forestry Annual Science Meeting, to be held in Launceston, Tasmania from 5-7 November 2008.

DIISR may wish to have a discussion, at the start of the Review possibly via teleconference, with the Panel to identify any issues arising in the context of the

CRC's Commonwealth Agreement. Discussion points may cover issues such as the purpose of the review, the role of the CRC Committee member, what DIISR requires from the panel, and CRC specific issues to be investigated. In providing any information to the independent review panel, DIISR will be guided by the Confidentiality provisions in the Commonwealth Agreement.

TERMS OF REFERENCE

The independent panel is required to submit a report addressing the following terms of reference.

A General issues

A key focus of the Third Year Review is to assess the CRC's performance to date in respect of the Commonwealth Agreement and its ability to deliver the proposed outcomes for industry and other end-users.

To this end, this component of the review will assess the following aspects:

- A1. Is the CRC on track to delivering the proposed outputs and outcomes? Is the CRC's ability to achieve its goals demonstrated by its performance to date?
- A2. Is the CRC's strategic direction in alignment with its end-user environment? Are any changes required?
- A3. What is the extent to which the CRC's research is seen by research users as value-adding to their business? Do end-users, in particular SMEs, have any issues in terms of access to or the quality of research?

B. Governance, management and collaboration

At the end of three years, a CRC is expected to have in place a robust governance and management structure including well established advisory and reporting arrangements. The review will assess the strength of these arrangements.

In broad terms, this component of the review will assess:

- B1. the effectiveness of the CRC's governance, management and collaborative arrangements in maximising the value-add of collaboration and achieving the intended results for the end-users;
- B2. effectiveness of budget planning and resource allocation to individual activities/projects;
- B3. any threats or opportunities in delivering the proposed outcomes for end-users, and strategies to address these; and
- B4. processes in place to monitor and manage the CRC's overall performance and to address any shortfalls in meeting contractual obligations.

The Board has also requested specific feedback on the performance of the CEO in relation to these matters.

C Commercialisation – Utilisation

The Third Year Review will assess a CRC's performance against its commercialisation and utilisation outcomes/activities and review the CRC's IP management and communication strategies/processes.

This component of the review will consider:

- C1. the effectiveness of the CRC's commercialisation, IP management and communication strategies, and whether these are in line with the current best practices;
- C2. the appropriateness of the CRC's path to adoption to the end-user/market environment;
- C3. progress made in terms of the CRC's commercialisation activities; and
- C4. progress made in terms of the CRC's utilisation activities, for example, uptake by industry or businesses of the information products provided by the CRC.

D Research

An independent scientific and technical review of the CRC's research programs and projects is a key element of the Third Year Review. This component of the review will assess each of the research projects with a view to recommending whether a project should, within the context of the CRC's overall strategy and contractual commitments, be continued, discontinued, refocussed or reviewed again.

In broad terms, the review will ascertain:

- D1. the progress made by the CRC in developing new products, processes or services as proposed in the Commonwealth Agreement;
- D2. whether there are any scientific and technical issues relating to individual research projects;
- D3. whether the CRC's research planning and leadership are effective, and programs are well integrated in terms of the CRC's overall strategy;
- D4. the level of research activity including patenting and publications, and the appropriateness of these mechanisms in transferring knowledge to the end-users;
- D5. whether the CRC's research is assessed as being of high quality by peers;
- D6. the extent of research collaboration, and whether the value-add of collaboration is evident; and
- D7. whether the CRC's research outputs are capable of meeting end-user requirements and market opportunities.

E Skills Development

A CRC contributes to skills development through research training for postgraduate students, development of courses for delivery at a tertiary institution and professional development courses/conferences for end-users and CRC staff.

The Third Year Review will assess the CRC's contribution to date, and its future plans for skills development.

In broad terms, this component of the review will assess:

- E1. the CRC's ability to attract high-calibre research students and the quality of research training and supervision;
- E2. the extent to which research students are involved in the CRC's research, project management and commercialisation activities;
- E3. the nature of courses being developed by the CRC for delivery at a university or other tertiary institutions or to industry directly;
- E4. industry's involvement in designing and delivering internal and external education and training programs;
- E5. demand for uptake of CRC's knowledge through technical conferences and professional development courses;
- E6. the nature of professional development courses delivered to CRC staff; and
- E7. the extent of industry involvement in the supervision of postgraduate students.

REVIEW REPORT AND OUTCOMES

The independent panel must submit a report to the CRC Board addressing the terms of reference. The report is required to adopt the format set out by the generic terms of reference, and should include:

- a description of how long, when and where the Review was held;
- membership of the independent review panel including declarations of their independent status and adherence to confidentiality agreements;
- terms of reference and methodology for the review; including a list of documentation provided to the Panel;
- an overview of the CRC's end-user environment including their research needs and any threats/opportunities for the CRC;
- a summary of the outcomes of the Economic Impact Assessment or the findings arising from the industry survey;
- a review of the CRC's governance and management arrangements including the strengths and weaknesses of the CRC's planning and reporting processes;
- a critical review of the CRC's activities in relation to research, commercialisation/utilisation, education and training;
- a review of the CRC's strategies and processes relating to its path to adoption, end-user involvement, commercialisation/utilisation, IP management and communication;

- a critical assessment of the CRC's performance to date and its ability to deliver the proposed outputs and outcomes; and
- recommendations on any changes required to the CRC's strategic direction and operational processes.

Appendix 3 – Documentation provided to the Panel

1. CRC for Forestry at a Glance;

Overview and Guide to Review Documentation CEO (Gordon Duff)

2. 3rd Year Review Terms of Reference

Cooperative Research Centres Program Third Year Review Guidelines for CRCs May 2008

Table of contents;

1. Commonwealth Agreement and Deed of Variation	App. 1
2. Participants Agreement	App.2
3. Strategic Directions Statement	App.3
4. Project Operating Plans	App.4
5. Project Agreements	App.5
6. Constitution	App.6
7. Annual Reports	App.7
2005/06	
2006/07	
2007/08(Draft) and Annual Financial Report for year ended 30 June 2008	
8. Research Advisory Committee and Visitor Reports	App.8
9. Highlights and Achievements	App.9
2006 and 2007 annual publications	
10. Economic Impact Assessment	App. 10
Draft Report by Agrtrans Research and eSYS Development October 2008	
11. Communications Strategy	App. 11
12. Intellectual Property Policy and Management Manual	App. 12
June 2007	
13. Allocation and Use of Commercialisation and Utilisation Funds	App. 13
14. Education Program Strategy	App. 14
15. Program Newsletters	App. 15
<i>The Monitor</i>	
<i>The Wood from the Trees</i>	
<i>The Log</i>	
<i>BioBuzz</i>	
<i>Communities newsletter</i>	
<i>Project update - Socio-economic impacts of land use change in the Green Triangle and Central Victoria</i>	
16. CRC for Forestry News	App. 16
17. Programme and Project numbers	App. 17
18. List of CRC students	App. 18

Appendix 4 –

Report of the CRC for Forestry Research Advisory Panel, December 2008

Glen Kile Visitor to the CRC, and Panel Chair, Programme 1(David Whitehead), Programme 2: (Steve Verry), Programme 3 (Loren Kellogg), Programme 4 (Sadanandan Nambiar)

Introduction

The CRC for Forestry Annual Science Meeting (3-7 November 2008) and associated activities provided valuable information to CRC partners, managers and researchers about the work in progress, achievements and future direction of the CRC. The ASM coincided with the 3rd Year Review of the CRC by the CRC Secretariat constituted review panel led by Professor Roger Sands.

The presentations of overviews by Programme and Project leaders that highlighted selected research and the excellent poster session by postgraduate students provided many examples of very good science, on topics ranging from cell level biophysical process to forestry and community. The approach to and the style the presentations were primarily aimed to inform and foster interaction between contributors. They were not designed to enable a critical review of science and performance on a project-by-project basis.

Programme Science Advisors had also been informed of programme progress through some level of ongoing interaction with the respective Programmes over the preceding 12 months and had access to a range of written material from CRCF including the draft 2007/2008 Annual Report and the Annual Operating Plan.

The Research Advisory Panel was provided with terms of reference in the form of five general questions –

1. Is the research up to international standards? (**Benchmarking**)
2. Is substantially similar work being done elsewhere? Are there additional opportunities for collaboration? (**Collaboration**)
3. Does the work look feasible and realistic given the available resources and time frame? (**Resourcing**)
4. Has adequate thought been given to pathways to impact or adoption of the research? (**Adoption**)
- 5a. Is the balance of projects and programmes right? 5b. Are there obvious areas for new engagement? (**Project mix**)

The Research Advisory Panel attended the presentations and poster sessions and met on several occasions during the ASM. It also met with the CEO and Programme Managers. This report provides an overview evaluation of issues that are generally common across all Programmes as well as individual Programme reports developed by each Programme Science Advisor.

Overall Evaluation

1. Is the research up to international standards?

- In general the standard of research in progress is very good. It is at the leading edge in some areas including CABALA process-based modeling; candidate genes for pulp yields; and the integrative research themes in forest and communities.
- There is, however, the need to invest effort to test “leading edge science” to enable more informed judgments (e.g. citation indices and publications categorized by sub-programmes; research bulletins; invited presentations). Whilst citation indices are lag indicators, examination of indices for a random selection of journal papers published by the previous CRC or in the early life of CRC Forestry would be a useful guide. This would also help with preparation for complying with the research quality assessment framework likely to be introduced by the Government later in 2009. The publication record across CRCF is somewhat uneven and we would strongly encourage that greater attention be paid to this in the coming year.

2. Is substantially similar work being done elsewhere? Are there additional opportunities for collaboration?

- Whilst external collaboration was noted to be variable across Programmes there are good linkages to research elsewhere but also good opportunities to enhance links with other research providers in some cases. Current strong links were evident in the eucalypt genomics area and in the performance of harvesting systems research. There are opportunities to strengthen links to water research within CSIRO and in eucalypt silviculture with research providers in South Africa and South America.

3. Does the work look feasible and realistic given the available resources and time frame?

- The overall CRCF programme is comprehensive but ambitious and the Panel has some real concerns about the potential mismatch between milestones/project objectives and available resources that need to be carefully considered.
- Postgraduate students are essential for research success and the CRC has an education mandate but there is a need to consider alternatives to heavy dependence on securing students to meet research objectives given the shortfall in student availability in some projects and the stage in the lifecycle of the CRCF. Alternatives include extending (purchasing) additional time commitments from existing scientists or contracting additional scientific staff.
- The Panel recommends a review of proposed pathways to achieve project milestones and a reallocation or reformulation of resources as necessary. It is suggested this be CRCF wide and combined into one plan following the third year review, for CRC Secretariat approval.

4. Has adequate thought been given to pathways to impact or adoption of the research?

- Adoption is not simply presenting results at workshops – the CRCF must show evidence of changes in industry practices at a large scale
- More emphasis is needed to recognize and implement pathways for adoption of research through better understanding of industry decision making processes for example in gene technology for tree breeding objectives, BPOS. The CRCF also needs to consider whether adoption is being impeded by industry capacity to invest in training and commitments for appropriate changes and how it can work

with its partners to overcome such obstacles. Turnover of the technical staff in the industry partners also may be an issue here.

- The Panel encourages economic quantification of impacts of selected research outcomes for large commercial scale applications.
- There is the need for an internal audit of planned “toolboxes” to prevent overlaps and ensure matching of input/output requirements within and between disciplines and to ensure toolboxes and products within toolboxes meet user requirements.

5a. Is the balance of projects and programmes right?

- **There is a comprehensive research programme established. However, it is set in place for the full CRCF term with limited capacity for internal adjustments in terms of projects and resourcing due to contractual commitments with partners. However, as noted at 3 above now is the time to make adjustments in terms of the life cycle of the CRCF. There is a real risk that several of the outcomes forecast will not be met, for example in water, silvicultural systems, and capacity to make changes to certification systems, unless they are revised.**
- **Strengthening the interface across research disciplines, technologies and potential inter-operability was seen a focus for the next several years to ensure maximum impact from the research programme.**

5 b. Are there obvious areas for new engagement?

- The emphatic view of the Panel is no. The key to success is to consolidate and focus on existing strengths with a sense of urgency to complete existing or revised deliverables. We also suggest greater efforts towards adaptive research aimed at understanding the impediments to the operational uptake of technology and practices to maximizing impacts.

In summary the RAP assessed the programme of the CRCF to be ambitious, the overall quality of the science to be very good, the likelihood of adoption to be high if due and focussed attention is given to all elements and cultures in the adoption chain. There are additional opportunities for collaboration and the resourcing strategies in relation to the deliverables (and some of the deliverables) need to be reviewed.

The RAP was greatly appreciative of the high degree of cooperation and openness of CRCF management and participants in relation to their work.