# Institutional Review:

*Assessment of the Arthur C Clarke Institute for Modern Technologies (ACCIMT)*

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# The Contents

# Abbreviations

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| ACCIMT | Arthur C Clarke Institute for Modern Technologies |
| BoG | Board of Governors |
| CEO | Chief Executive Officer |
| CPD | Continuing Professional Development |
| DMS | Department of Management Services |
| HoD | Head of Division |
| HoT | Head of Technical |
| ICT | Information and Communication Technology |
| IT | Information Technology |
| LAN | Local Area Network |
| LEARN | Lanka Education Academic and Research Network |
| MIS | Management Information System |
| NASTEC | National Science and Technology Commission |
| R&D | Research and Development |
| RS/GIS | Remote Sensing/Geographic Information Systems |
| S&T | Science and Technology |
| SCC | Salaries and Cadre Commission |
| TEC | Technical Evaluation Committee |
| ToR | Terms of Reference |

# Acknowledgements

The Review Panel wishes to appreciate the confidence placed on the Panel by the National Science and Technology Commission to carry out this review and also for the guidance provided so that the review is well harmonised with the Review Manual Guidelines.

The support by the NASTEC Acting Director Dr. Muditha Liayanagedera and Ms. Asha Pitadeniya, Scientific Programme Manager, who coordinated this review in numerous ways enabling timely completion of the work, is gratefully acknowledged.

The Director/CEO of the Arthur C Clarke Institute for Modern Technologies, and his staff received us well to the institute and cooperated fully in carrying out this review. The Board of Governors spared their valuable time for a special meeting with us to exchange views and enable us to gain insights into the strategic directions for ACCIMT and the Board interactions with the executive staff. We are deeply appreciative of this cooperation and input by the Board, the Director/CEO and the staff.

# Executive Summary

The Arthur C Clarke Institute of Modern Technologies (ACCIMT) is a statutory corporation operating within the purview of the Ministry of Technology and Research. The ACCIMT was established on April 1, 1998 by the Science and Technology development Act No. 11 of 1994, as the successor to the Arthur C Clarke Centre for Modern Technologies (ACCMT) established by Act No. 30 of 1984.

The Science and Technology Development Act No. 11 of 1994 mandates the National Science and Technology Commission (NASTEC), *inter alia*, to review and report on the progress of science and technology institutions. Accordingly, this review is carried out with the specific objective of determining the progress of the "The Arthur C Clarke Institute of Modern Technologies (ACCIMT)" in achieving its mandate.

The performance review was carried out during the period August to October 2012 by an independent panel of five members appointed by the NASTEC in consultation with ACCIMT. The general objective of the review was to assess how effectively the ACCIMT has acquired and utilised the resources to generate programmes and activities consistent with the mandate, and produce outputs that are relevant to its stakeholders and contributed to the national development efforts. The review mainly presents a snapshot view of the Institute's performance at the time, and does not reflect a historical view or a comparison of its performance over the years, although appropriate comments are made on such aspects where relevant.

The professional opinion of the panel was developed based on the general guidelines contained in the 'Review Manual – Procedure for Performance Review of S&T Institutions' developed by NASTEC. This required an assessment of the outputs of the institution as well as its management processes. The commencement of the review was based on a self-assessment report provided by the Institute covering the performance over the preceding three years.

It is important to understand the context in which the Institute operated during the last few years in order to give perspective to its performance. Two primary constraints need to be highlighted; very poor staff numbers in relation to the cadre and their qualifications and experience, and the limited funds allocation by the Treasury and delays in disbursement. The inability to recruit staff is mainly in view of the restrictions imposed by the Salaries and Cadre Commission although the unattractiveness of the remuneration levels will continue to pose a problem in recruiting and retaining researchers, particularly engineers.

Separate detailed commentaries on the management aspects and outputs are given in Sections 3 and 4 while Section 5 gives an overview of the performance. Based on these, the reviewers overall findings on the performance and the recommendations for improvement are given in Section 6.

Apart from isolated instances of significant input to national economy, in general the expectation in terms of contribution is only partly achieved, and not as expected in the mandate; possibly seriously affected due to the constraints highlighted above, but inadequacies of the management processes also would have undoubtedly contributed towards the moderate performance. Stakeholders however positively commented about the 'testing and calibration services' and the 'consultancy

services' offered by the Institute. While significant resource input and increased autonomy will clearly enhance the overall performance, the recommendations in the report are made to enable increased effectiveness in the delivery of the expectations within these resource constraints. The need for increased autonomy to ensure better planning and implementation by the Institute, with reduced delays and more accountability cannot be over-emphasised, enabling it to acquire a more dynamic outlook. A summary of the recommendations follows.

## I. Strategic and Corporate Planning

The Corporate Planning process needs to be strengthened substantially based on a structured process with the use of external expertise as necessary, particularly in view of staff resource constraints. The process should ensure more comprehensive Board direction and stakeholder consultation. Corporate Plan should be updated annually on a rolling basis considering national policies and priorities, and changes in the external and internal environment with a review of the organizational policies and strategies as necessary. The needs and plans for restructuring should be addressed and incorporated and it should be ensured that the Annual Action Plans are more aligned to the Institute's Corporate Plan. Strategies to develop international partnerships should be addressed particularly for ensuring exposure and knowledge transfer in modern technologies as well as for raising donor funds.

## II. Programme Planning, Project Identification, and Implementation

The orientation of developing disconnected projects largely identified at Division level needs to be changed and a programme led approach has to be established. The Institute should clearly identify a limited number of programmes based on prioritised thematic thrusts addressing national technology needs identified in the Corporate Plan, and develop projects fitting into these programmes. Multidisciplinary projects, partnerships with private sector and universities, and international collaboration should be encouraged in programme/project planning. Existing project proposal approval procedure needs to be reviewed, improved and formalised to clearly address the relevance, significance, outputs and resource needs to enable prioritisation within the constraints so as to ensure timely delivery of expected outputs. Similar improvements are necessary for project monitoring, review and quality assurance.

## III. Technology Transfer and Extension Services

The inadequacies of the current linear technology transfer/extension process should be addressed through a full review by the management of the approach adopted. More effective, multiple routes of communication and dissemination of outputs should be employed to proactively push the technologies to clients and end users. On the other hand, more emphasis on stakeholder involvement at early stages of the projects should be encouraged to enable effective transfer and adoption by the end users. It is also recommended that this weak area is comprehensively addressed in the development of the new Corporate Plan, identifying the needed strategies. The institute should also pay due regard to the need for intellectual property protection, through patents, appropriate licensing agreements and other means.

## IV. Human Resource Management

In addition to following the now approved SCC/DMS guidelines on recruitment, a degree of innovative lateral thinking has to be exercised in filling the senior professional level positions in order to ensure proper guidance of junior staff/the likely new recruits; for example by way of university secondments, industry sponsored research fellows, and similar fixed term contracts.

Training programmes and a calendar need to be established based on a systematic training needs analysis and implemented together with the performance management system. It is also recommended to establish an ongoing Performance Management system in relation to agreed objectives, facilities available, training needs, and agreed performance indicators. In addition to the significant issue of the poor salary structure which is now being addressed, the management should formally examine possible approaches to ensure improved job satisfaction, and work out strategies for retention of staff.

## V. Documentation, Knowledge Management and Management Information Systems

The process/procedure documentation needs improvement to ensure consistency, transparency and accountability of all the Institutional activities. The issue of loss of knowledge with the loss of staff has to be addressed by developing appropriate novel methodologies for project implementation by encouraging team approaches. Good technical documentation and developing opportunities for knowledge sharing through research meetings/seminars, and developing an IT based knowledge management system is recommended. A fully fledged IT based MIS should be designed, developed and installed at ACCIMT to improve decision making by the management as well for the exchange of information among Divisions and staff members.

## VI. Communication and Information Dissemination

The methods employed to communicate with the Clients and other stakeholders need to be expanded with more publications such as newsletters, policy briefs, books, information leaflets and brochures. The website needs to be improved with more detailed information and feedback mechanisms with facilities for inquiry. Encouraging publications in reputed refereed journals are other means recommended for information dissemination. A strengthened corporate communication/media unit is recommended to follow up such activities in a focussed manner.

## VII. Organisational Assets (Infrastructure/Funds/Knowledge)

It is recommended to develop strategies and processes, and encourage staff to actively explore alternate donor funding opportunities in future R&D planning in order to be less dependent on treasury grants. This will also improve international partnership activity essential for keeping up to date with cutting edge technologies.  Strategies to minimise knowledge loss along with staff loss, by innovative ways of working, particularly within the technical divisions, is required. A culture of patenting as a means of intellectual property protection need to be developed and promoted.

# 1. The Arthur C Clarke Institute for Modern Technologies

The Arthur C Clarke Institute of Modern Technologies (ACCIMT) is a statutory corporation operating within the purview of the Ministry of Technology and Research.  The ACCIMT was established on April 1, 1998 by the Science and Technology development Act No. 11 of 1994, as the successor to the Arthur C Clarke Centre for Modern Technologies (ACCMT) established by the Act No. 30 of 1984.

The Science and Technology Development Act No. 11 of 1994 mandates the National Science and Technology Commission (NASTEC), *inter alia*, to review and report on the progress of science and technology institutions. Accordingly, this review is carried out with the objective of determining the progress of the "The Arthur C Clarke Institute for Modern Technologies (ACCIMT)" in achieving its mandate.

## I. The Mandate of the ACCIMT

The role of the Arthur C Clarke Institute for Modern Technologies is defined by the Science and Technology Development Act No. 11 of 1994 as:

a. To accelerate the introduction of modern technologies to Sri Lanka by;
   i. Initiating, promoting and conducting research and development in the application of modern technologies,
   ii. Providing research and development support to the Government and private sector undertakings in the application of modern technologies, and
   iii. Training of personnel in modern technologies to meet the needs of the Government and private sector undertakings.

b. To promote future studies

The areas of modern technologies include Communications and related Sciences, Information Technology, Electronics, Micro-electronics, Space Technologies, Robotics, Photonics and new materials.

## II. The Vision of the ACCIMT

The Vision of the Arthur C Clarke Institute for Modern Technologies is to achieve a status enabling it to evolve as a unique centre of excellence in modern technologies, inspired by Deshamanya Sir Arthur C Clarke.

## III. The Mission of the ACCIMT

The Mission of the Arthur C Clarke Institute for Modern Technologies, as developed by the Institute, is to become a premier institute for exploration, technology transfer, research & development and human resource enhancement enabling solutions in applications of modern technology to improve the capabilities of industries and commercial establishments and thereby enhancing national wealth.

## IV.  The Corporate Goals

The mandate of the ACCIMT has been translated into a number of broad goals in the 2008-2012 Corporate Plan:

- Achieve Recognition as a Centre of Excellence in Electronic Product Development, Robotics and Automation.
- Achieve Recognition as a Centre of Excellence  in 'Testing and Measurement Services' to the Engineering Community
- Be a Premier Institute in Providing Continuous Professional Development (CPD) programmes to the Engineering Community in Relevant Areas
- Achieve National Excellence in Information and Communication Technologies (ICT)
- Transfer Technology to the Villages to Empower the People and to Provide for a Better Quality of Life to the People Living in Rural Areas
- Develop a National Centre for Remote Sensing / Geographic information System (RS/GIS) Applications
- Develop a Premier Centre for Observational Astronomy
- Create a Conducive Environment at the Institute to achieve Excellence in all its Activities.

## V.  Governing Ministry

The ACCIMT, (formerly known as the ACCMT) which was under the purview of the Ministry of Higher Education in 1984 was brought under the purview of the Ministry of Industries, Science and Technology in 1990. With the establishment of the new Ministry for Economic Reform, Science and Technology, in December 2000 the ACCIMT too was transferred under its purview. In 2004, the institute came under the purview of the newly constituted Ministry of Science and Technology. In 2010 The Ministry of Science & Technology was renamed as the Ministry of Technology & Research and the ACCIMT continues to function under the purview of this Ministry *(Annual Report 2011)*.

## VI.  Sources of Funding

A high proportion of ACCIMT funding is from the Government; with a smaller portion met from internally generated funds mainly from 'Testing, Measurement and Calibration Services' and 'other consultancy work'.  In 2011 the government grants received during the year for capital and recurrent expenditure were Rs. 24M and Rs.53M respectively. Total revenue generated by the Institute was Rs.18.4M, approximately 27% of the recurrent expenditure *(Annual Report 2011)*.

## VII.  The Context

The opinions expressed and the contents of the report present a view and make recommendations aimed towards achieving the full potential of the Institute. However, the Institute operates under some underlying serious constraints, which have to be taken note of in interpreting or drawing conclusions from this report.

A primary resource constraint faced by the Institute is the strength of its staff both in numbers and in the level of seniority and experience. In 2011 out of a cadre of 140, only 72 numbers were on the payroll. For professional staff this ratio is worse with only 23 filled out of a cadre of 59.

It is clearly very difficult to recruit and retain the right type of Engineers and other staff of the right calibre at the current public sector remuneration levels, particularly considering the prevailing market conditions, not only in the private sector but also within the public sector itself. This is compounded by the directives emanating from the Department of Management Services, where the need for a new restructuring and re-categorisation of employees has come into play requiring approvals from them and the SCC which are quite long drawn out, in effect stifling recruitment over the last five years. It is only in 2012 that special permission has been obtained to recruit some entry level engineers, pending full finalisation of the scheme of recruitment and approval. This has impacted the institute badly in developing its own staff, and is illustrated by the severe shortage of senior personnel of high calibre; for example the Institute has not a single PhD/MPhil qualified senior researcher. Experienced chartered engineers fill this gap somewhat, but the people, structures and systems in place do not augur well for the future too in planning for the development of a competent high-calibre staff base.

The limited allocation of Treasury Funds and the timing of disbursement are not quite conducive in developing and executing the necessary plans for an ideal operation. Of a capital allocation of Rs. 55M, only Rs.24M was received during 2011; of the recurrent allocation of Rs.70M, Rs.53M was received. One could also argue that the slow release of funds is due to lower expenditure by the institution, but the Institute's inability to plan for expenditure according to the allocation due to non availability of funds must also be recognised – creating a vicious cycle of sorts.

## 2. The Review Procedure

### I. The Panel and the Methodology

The performance review was carried out by an independent panel of five members, appointed by the National Science and Technology Commission (NASTEC) in consultation with ACCIMT. The Panel comprised:

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| Eng. Dr. S.A.K. Abayawardana Chairman | former Director, National Science Foundation; former Head/Sri Lanka Program, International Water Management Institute; former Technical Director, Unilever Ceylon Ltd |
| Dr. P. G. Wijayarathna | Senior Lecturer, Information Technology, Department of Industrial Management,  Faculty of Science, University of Kelaniya; Subject Reviewer (Computer Science), Quality Assurance and Accreditation Council, University Grants Commission Sri Lanka |
| Eng. Prof. H.S.C. Perera | Professor of Management of Technology, University of Moratuwa |
| Eng. G.B. Wimalaratne | Former General Manager, National Engineering Research and Development Centre(NERDC); Consultant Engineer, World Bank funded Renewable Energy for Rural Economic Development(RERED) Project |
| Mr. G.P. Jeerasinghe | Visiting Lecturer at Institute of Personnel Management (Attorney-at-Law) |

The general objective of the review was to assess how effectively the ACCIMT has acquired and utilised the resources to generate programmes and activities consistent with the mandate, and produce outputs that are relevant to its stakeholders and contributed to the national development efforts.

The members of the team were quite conscious of the fact that while the review report must address the needs of all concerned parties, such as policy makers, the relevant line Ministry, and the Treasury, its most critical function is to guide the Institution being reviewed towards self-improvement, at the institutional, programme, project, and individual levels.  The team has done its utmost to ensure that the analysis, findings and the recommendations are carried out and presented in a completely unbiased manner, and presented constructively.

The professional opinion of the panel was developed based on the general guidelines contained in the 'Review Manual – Procedure for Performance Review of S&T Institutions' developed by NASTEC. This required an assessment of the outputs of the institution as well as its management processes.

### II. Pre Assessment
A number of basic documents were made available to the panel by NASTEC;
- Review Manual – Procedure for Performance Review of S&T Institutions

- Self-Assessment Report prepared by the ACCIMT management
- The Terms of Reference for the Review
- The Science and Technology Development Act No. 11 of 1994
- The Corporate Plan 2008-2012

Following a study of these documents, the panel met on August 28, 2012 for a preliminary discussion to clearly understand the ToR and map out its review activities. Further documentation support was requested;

- Annual Reports- last 5 years
- Final reports of a few key projects
- Documentation on IT projects - design documents, test plans, user manuals, trouble shooting documents
- Quarterly progress reports
- Budget for each division, allocated and received funds, expenditure by Division
- Information on patents
- Organization Chart
- S&T staff strength
- Recruitment and Promotion scheme
- Salary Structure

## III.  The Assessment

The review programme comprised;

- A review team meeting on August 28, 2012 to discuss the operation and performance of the Institute, based on available material and schedule out its planned review activities
- A review visit by the team to the Institution over two days, September 10 and 11. The visit commenced with a meeting of the entire senior management team of the institution with an introductory presentation by the Director/CEO, followed by visits to all Divisions of the Institute and discussions with the relevant staff
- A meeting with stakeholders at NASTEC on September 19 where a limited number of stakeholders were present
- A further visit to ACCIMT on September 26, where the ACCIMT Board was met
- Further discussions with relevant Heads of Divisions as necessary
- Collection of additional documents during the discussion for information and validation
- The review team discussions and meetings on October 3, 13 and17
- Presentation of the draft report to the NASTEC in end October 2012 to seek views and comments from the Director ACCIMT

## IV.  The report

Based on the findings, different sections of the report were prepared by different team members and collated and finalised based on a series of team meetings. The final document was prepared by consensus with the agreement of all team members. The opinions expressed and the recommendations made are therefore collectively by the team.

# 3. Commentary on Management Assessment

The ability of an institution to produce useful and relevant outputs depends on internal policies, strategies, management practices and the way in which these are applied. The NASTEC Review Manual identifies nine management aspects along with the salient features of each management aspect that are applicable to S&T institutions in general (for the most part applicable to the ACCIMT as well). The management review was carried out based on these aspects and the following paragraphs summarise the key points identified as the Institute's strengths and weaknesses in each area leading to the recommendations in Chapter 6. The relevant analysis tables are given in Appendix 1.

I. **Assessment of institutional response to external and internal environment in planning organisational strategies**

The review panel found the corporate plan prepared for the period of 2008 – 2012 is a comprehensive document with many of the strategies necessary to achieve the mandate of the institution well identified. The implementation of this plan however appears to be weak; undoubtedly the resource constraints play a part. This document also has not been updated annually on a rolling basis responding to changes in the external and internal environment. There was no evidence of a formal process either, for updating strategic and corporate plans annually on rolling basis. It is however heartening to note that a process has commenced for a full review of the Corporate Plan in 2012, with the likely output of a comprehensive Corporate Plan for the period 2013-2017.

Participation of stakeholders and staff in the planning process is very limited, other than discussions with Heads of Divisions and Head of Technology by the Director/CEO leading to a submission of a draft to the Board of Governors for their inputs. It is understood that further external stakeholder views and feedback may be sought at this point.

Annual action plans are prepared by the institute. These however do not substantially align with the goals of the Corporate Plan, although it is observed that some of the Government policy directions are considered in their 2012 action plan. The need to prepare the plans in different formats required by the Ministry may have played a part in this.

II. **Planning S&T programs and setting priorities**

The panel observes that the S&T program planning is weak at the Institute. The availability of a clear structured process of planning S&T programmes is not evident either. A majority of R&D work is mainly oriented towards product development initiated by individuals based on their interest and within their expertise. They are not quite well linked to major Institutional S&T programmes with specific objectives or formally linked to national development goals.

However, the initiative taken to establish a robotics laboratory and a space technology division is a step in the right direction of developing thematic programmes in specific modern technologies. Better results can be achieved if these are implemented based on a comprehensively

documented development and implementation plan, outlining the objectives, expected deliverables and resource needs over a period.

It is imperative for the Institute to shift to a 'programmatic planning' process with BoG and stakeholder input where a limited number of high priority thematic programme areas are identified, and all other projects are developed around these themes rather than work on a number of disjointed standalone mini-projects mainly generated from within divisions.

## III. Planning S&T / R&D Projects

Many S&T/R&D projects in ACCIMT are initiated by the technical divisions based on the interest of individual researchers. Detailed project proposals are the exception, most are simple concept notes. Guidance given by the corporate plan is used in planning the projects only up to a limited extent, although some projects evolve based on past data and results (e.g. traffic light and locomotive projects).

Current practice of project approval is by the Director/CEO based on discussions with the researcher /Head of Division/Head of Technology.  In certain occasions BoG approval is obtained. Apart from review at the level of Director/CEO and in some cases the Board, no detailed evaluation is carried out by a review team, internal or external.  There had been a Technical Evaluation committee (TEC) in the past for S&T project evaluation, but it has ceased to function at present.

Almost all the projects are within each technical division and inter-divisional collaborative work is limited.  Donor funded collaborative R&D projects are also rare. Only one such project carried out with the collaboration of GIC-AIT Thailand was noted.  Some Industry oriented projects have evolved out of short-term consultancies. Majority of the projects are product development oriented while the astronomy division carries out a few basic research projects to expand the knowledge and expertise in the particular area.

ACCIMT has attempted to address social needs by carrying out the projects such as "Math Master Play & Learn Systems for Blind Children" and "PC based ECG Monitor". The institute has considered environmental needs as well in developing its project portfolio (e.g. wireless irrigation automation).

Commercialization aspects are not adequately considered at the time of project formulation and even after the completion of the project. The technology transfer rate currently is very poor and it appears that the technology transfer process needs to be substantially strengthened.

## IV. Project management and maintenance of quality

The researchers are generally satisfied with the administrative procedures and support in implementing the projects.

Formal monitoring and review procedures, and quality assurance procedures are inadequate in the Institute. Project reviews are taken up at the monthly management meeting, focus of which mainly is day to day management issues. The non-functioning of the Technical Evaluation

Committee has removed one important reviewing instrument. The Director/CEO makes a progress presentation to the Board on a monthly basis, but this is in abstract form, and does not give adequate information for a formal project review, nor can the Board devote sufficient time during the monthly Board Meeting for this. There is no evidence to suggest the existence of dedicated project progress and quality review meetings.

The Institute has adequate technical and field staff for the limited number of projects now in hand. This may however need to be reviewed as the projects grow with the recruitment of research staff to fill the cadre.

Established field / lab methods and appropriate protocols are used in research and consultancy activities, with the highlight being the ISO 17025 certification of the procedures used for testing of Surge Protective Devices. Perhaps this approach can be extended on a wider basis. Many clients positively commented on the delivery of the services at the stakeholder meeting.

ACCIMT provides adequate library facilities to its staff including required journals and access to digital libraries. The researchers have good IT facilities including computers, software and access to the internet.

## V. Human Resource Management

The constraint of poor human resource strength is a key impeding factor for the Institute in achieving their objectives. In 2011, out of the approved cadre of 140, they had only 72 on the payroll. A new structure and a cadre have been approved by the Salaries and Cadre Commission in 2012 allowing a cadre of 176. Recruitment however has been allowed only for entry level engineers pending the finalisation of the Scheme of recruitment. Even with the recent recruitment of 7 engineers, the current strength is only 78.

Recruitment for Higher and Junior Management professional categories will be a herculean task due to the poor salary structure. With the new structure proposed to the SCC/DMS, proper Job descriptions and specifications have been developed. Personal files and records of disciplinary inquiries are being kept properly and creating a database for the employees also has been undertaken but not completed.

Training has not been planned out based on a training needs analysis and the training provided, both local and foreign, has been largely opportunity based rather than need based. Personal development programmes conducted have been very few and not adequate. The performance appraisals conducted are not comprehensive and done once in a year thereby not contributing to map out the training /development needs.

The sharing of the income generated from consultancies and training programmes amongst the staff alleviates the burden of poor salaries to a certain extent but has not been quite adequate in curtailing the high turnover of staff. Poor salaries invariably are a major reason but there are some other contributory factors as well towards the high turn-over. For example, in the absence of any PhD or MPhil qualified seniors, the expected proper supervision/guidance is not forthcoming leading to dissatisfaction and low morale amongst new/junior staff. There had

never been any HR audits done in order to ascertain the actual HR climate, which would have enabled the clear identification of relevant factors and corrective action to be taken.

## VI. Management of Organisational Assets

*Infrastructure and Services:* As space limitation is clearly a constraint in carrying out its mandated activities in the future, the institute is now constructing a new building adjoining the present premises. Vehicles and equipment appear to be properly managed and maintained, but more attention is required for good housekeeping and safety practices. Due to the insufficient number of drivers (5 drivers, 8 vehicles), the institute spends about Rs. 50,000/= per month for hired vehicles. Most of the equipment are well serviced and in working conditions. Service agreements are maintained to ensure the conditions of general office equipment as well as sophisticated laboratory equipment.

*Funds:* The total annual capital and about 80% of recurrent expenditure is met with government grants and the balance requirement of about 20% is generated through various undertakings. The process of allocation of financial resources among the divisions is however not clear. According to the financial performance during the 2008 – 2010 period, hardly any increase in the research expenditure is noticed. The limited activities due to insufficient staff, as well as limited treasury allocations and disbursements could be a reason for this, and it would therefore be desirable to actively explore alternate donor funding opportunities in future R&D planning in order to be less dependent on treasury grants. In order to derive best benefits from this approach, a reasonable degree of autonomy in managing their own affairs would be desirable.

*Knowledge and Intellectual Property:* It was evident that the inability to retain staff and the consequent staff loss frequently results in knowledge loss as well, adversely affecting the Institute's work in multiple ways. The management is aware of this but appears not to have taken any proactive measures to minimise the impacts of this problem, other than attempting to reduce staff turnover by increased remuneration. The institute has not as a practice promoted patenting as a means of intellectual property protection, with no patents over the last four years.

## VII. Coordinating and integrating the internal functions/units/activities

The ACCIMT is in the process of making necessary internal changes based on current industry needs. The Robotics Laboratory established within the Communication division is a result of response to the growing importance of the applications of Robotics and Automation in the industry. The RS/ GIS research work within the soon to be constituted Space Technology Division is another initiative taken by ACCIMT.

The Heads of Divisions (HODs) coordinate the R&D activities/services within each division. At the moment, inter divisional coordination is limited to a few joint R&D projects. The Head of Technical (HoT) is the communication window between technical divisions and the management.

Enhanced in-house ICT systems improve internal management functions. ACCIMT LAN provides good Internet and Email services to all divisions through the LEARN network. However, a

computer based Management Information System which will enhance the data collection and reporting, and the communication and coordination among divisions is not available at the moment. Such a system will enable management to improve the effectiveness of planning and monitoring and its operations.

Currently, there is limited, informal feedback to the management from the staff. It is also very hard to find formal mechanisms for obtaining feedback from stakeholders. Such feedback and collaboration with stakeholders will enable improving the performance as well as help identify future strategic directions.

## VIII. Partnerships in managing information dissemination

The Corporate Plan 2008-2012 goals and objectives lay out certain strategies related to dissemination of information, but not quite reflected in the action plans over the years. At present, information dissemination activities are planned and performed by the respective divisions in an ad-hoc manner, rather than with a strategic approach. Other than general public awareness programmes, high level information dissemination in the form of publications, conference proceedings and policy briefs etc. were somewhat weak.

Two of goals out of eight in the corporate plan 2008-2012 through their strategies suggest linkages between ACCIMT and universities, R&D institutes, and other organizations. Even though few such links exist, the review team could not find evidence for the existence of a formal process for establishing and maintaining these links nor in fact instances of such long term collaborative activity. While some links were evident with industries in providing consultancy services, formal long term collaborative partnerships were absent in this instance as well.

The section 2 of the corporate plan 2008-2012 for ACCIMT suggests workshops, seminars, and training programs as mechanisms to transfer appropriate technologies to villages with little or no technology and to small and medium scale enterprises in need of technology know-how. The feedback from participants of such activities is considered as a good performance indicator of ACCIMT technology transfer activities. However, the review team is of the view that the ACCIMT lacks a formal process for collecting and evaluating feedback on a regular basis.

The website of the Institute is another instrument that can be used for wide information dissemination and corporate communications. As at now, it is merely a description of the Institute and can be vastly improved to communicate more effectively the institute, its work, its offerings, and can be developed with online interactive means to invite more feedback and establish contacts, particularly for information dissemination and technology transfer.

## IX. Monitoring, evaluation and reporting procedures

At the implementation phase of the projects, monitoring, evaluation and reporting activities are conducted at the division level in an ad-hoc manner. The formal review meetings with HoD, HoT, and the Director/CEO are conducted when necessary, but not regularly. Progress review is an agenda item of the monthly Management Committee meetings, but it is clear the emphasis at

these meetings is on management/administration issues and does not afford adequate opportunity for a closer review of the progress of S&T/R&D activities.

The style and the format of the progress report submitted to the monthly Board Meeting by the Director/CEO, suggest that this is more of a status report of various projects and does not amount to a structured progress review, nor can the Board devote adequate time at these meetings to a full review.  The review team finds that periodic monitoring, evaluation and reporting mechanism is inadequate.

The budgets, expenditure and other financial information related to completed as well as ongoing projects are kept at the accounting division of ACCIMT, and are handled manually. HoDs can obtain this information by making a request to the accounting division. There is however no evidence of such information being presented researchers on a regular basis. The review team is of the view that a proper management information system is not in place at the moment to support monitoring, evaluation and reporting mechanism.

The R&D/project outputs and other test results are reported internally to the HoD/supervisor by engineers/scientists at the divisional level. These results are used to a certain extent for project related decision making.

External stakeholders are hardly involved in the monitoring and evaluation process. Formal stakeholder meetings are not conducted regularly. Stakeholder feedback is informal in nature.

# 4. The Commentary on Outputs

The output assessment was conducted by reviewing relevant output categories defined in the NASTEC Review Manual. These are 'technologies developed', 'technologies transferred to industry', 'information dissemination', 'research publications', 'patents', 'services provided', 'training', 'other related outputs'. Only stakeholder oriented outputs are taken into account in the main categories; the developments carried out for internal operational improvement are shown as 'others'. Outputs from year 2008 to year 2011, as highlighted in the Annual Reports form the basis for this analysis. There is an approximate correlation of these figures with the summary of outputs produced by the Institute specifically for the review exercise.

## I. Overall Output Analysis

Table below is a summary of the outputs.

| ACCIMT - Output Analysis (2008 - 2011) | | | | | | |
|---|---|---|---|---|---|---|
| (Based on the Annual reports 2008 to 2011) | | | | | | |
| Output Category | 2008 | 2009 | 2010 | 2011 | Total | % |
| (1) Technologies developed | 6 | 3 | 3 | 2 | 14 | 1.7 |
| (2) Technologies transferred to industry / entrepreneurs | 1 | 0 | 1 | 0 | 2 | 0.2 |
| (3) Information dissemination / extension | 24 | 37 | 79 | 59 | 199 | 24.5 |
| (4) Publications | 3 | 1 | 1 | 1 | 6 | 0.7 |
| (5) Patents | 0 | 0 | 0 | 0 | 0 | 0.0 |
| (6) Services | 78 | 115 | 131 | 209 | 533 | 65.6 |
| (7) Training | 10 | 15 | 12 | 12 | 49 | 6.0 |
| (8) Other | 2 | 1 | 5 | 2 | 10 | 1.2 |

The numbers listed in the above table are approximate values. There may be missing information and interpretational errors. However, an approximate comparison between output categories, particularly the trends, would give sufficiently meaningful information for an analysis of the performance of the Institute during the period under review.

More than 90% of ACCIMT outputs in event numbers are coming from just two output categories; Services, and Information dissemination, of which more than 60% are from Services. The technologies developed, technologies transferred to industries, publications, and patents contributed less than 3%. It is however to be noted that a direct comparison of numbers from different categories while giving an indication does not reflect the significance of the events/outputs, as they vary substantially from category to category. In any case, a closer examination also reveals that the contribution from Technology Development/Transfer is not quite up to expectation. On the contrary the Services carry some significant contributions too; for example the hardware recovery of locomotive engines.

The Chart below clearly shows that number of Services provided is gradually increasing from 78 events in 2008 to 209 in 2011. This is in line with ACCIMT short term policy direction to increase the proportion of internally generated funds enabling better remuneration to the staff as a key strategy
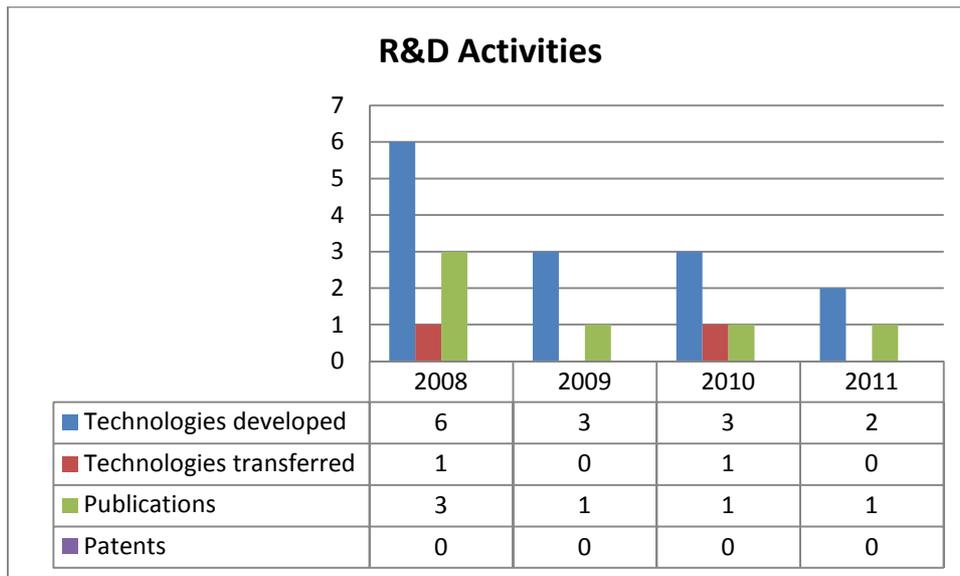
in recruiting and retaining professional staff. This is a good approach, but the overall strategy must also address its key objective of improving modern technology applications.
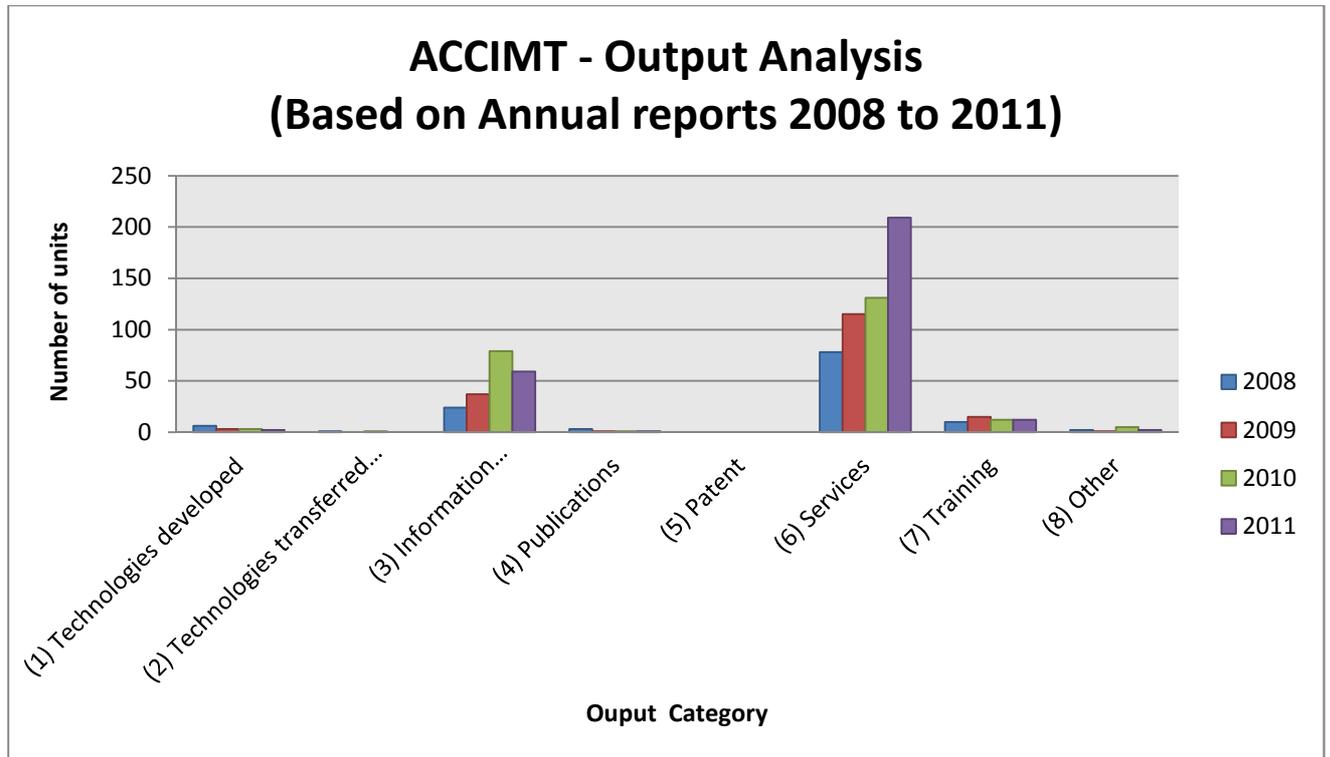


In terms of numbers given here, the training programmes are quite successful and well received by the stakeholders, clearly making a contribution towards capacity building in industry. It is noted that about 10-15 different courses/workshops are held in a year of which half can be classified as continuing professional development courses, while the rest are more basic/intermediate level courses. The high figure for 'Information Dissemination/Extension' comprise largely of basic awareness programmes and not of significant high level dissemination activity.

## II.   Technology Related Outputs

The projects listed under Technologies Developed are mainly distinct unlinked product development work as opposed to addressing important modern technology programs and needs.  These numbers are  quite low, resulting in low technology related other outputs such as the number of patents, publications, and technologies transferred to the industries. The following chart is developed by extracting the numbers for R&D/technology related activity from the main table. This clearly highlight that activity in this area is in fact decreasing over the years and possibly require improved focus and fresh impetus. This is in contrast to the gradual increase in Services, and Information Dissemination activity over the same period.

*Institutional Review: Arthur C Clarke Institute for Modern Technologies*

## R&D Activities



| | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|
| ■ Technologies developed | 6 | 3 | 3 | 2 |
| ■ Technologies transferred | 1 | 0 | 1 | 0 |
| ■ Publications | 3 | 1 | 1 | 1 |
| ■ Patents | 0 | 0 | 0 | 0 |

If outputs from these categories are to be increased, programmed and planned R&D activity with a stakeholder orientation should be the focus of the Institute. In order to achieve this, the number of qualified, and experienced research engineers/scientists should be increased in the first instance. The present HR constraints in terms of numbers were discussed earlier, but an extract from the Annual Report 2010, where in section 4.1.5 on Wireless Data Display Board - "The project is temporary halted since August 2010, as Engineer in charge Ms.(name withheld), was assigned to the PC based ECG project" - clearly illustrate the on-the-ground reality of this situation.

# 5. The Overview of Performance

The mandate of the ACCIMT has been translated into a number of broad goals in the Corporate Plan 2008-2012, outlined in Chapter 1, which is the most recent comprehensive strategic document available to use as a base for carrying out the current assessment.  The review approach adopted was therefore thus oriented and the review comments on performance are broadly in relation to these goals. Clearly due note should be taken of the contextual reasons discussed earlier in the interpretation or giving weightage to the following comments.

## I.  Strategic and Corporate Planning

The Corporate Plan 2008-2012 is very comprehensive and the strategies developed address many of the improvements required, but actual adherence to this Plan and its implementation is not evident.  While it is clearly understood that it is very difficult to fully achieve the Goals as set out in the Corporate Plan in view of the serious constraints elaborated earlier, it is in fact just for such reasons that very tight and careful planning is required to prioritise the activities in order to optimally utilise the available resources to achieve best results under the circumstances. It is not evident that this has been carried out in the Institute. The 2008-2012 Plan had not been further developed in a comprehensive manner on a rolling basis. It is also not clear what methods were adopted to prioritise the plans and the activities on an annual basis, although annual action plans are available.  There is also little evidence to suggest that the action plans relate well to the Corporate Plan.

A process has now commenced to develop a fresh Corporate Plan for the five years from 2012. Some of the key issues that need to be addressed are already identified on a broad basis. Some of them being; Technology changes into areas such as space technologies and robotics, some structural changes, and the need to be less dependent on treasury funds particularly to facilitate adequate remuneration levels in line with market forces. The institute should also use this opportunity to question some of the existing activities and their relevance at this point. For example the IT Divisions work on software development is questionable in the context of the mandate.

The process methodology adopted to develop the Plan is also not quite clear apart from planned regular internal discussions with Heads of Divisions. There was also no evidence to suggest that adequate stakeholder consultations are being planned as input to the process and the Plan.

## II.  Outputs

Outputs of the Institute are viewed in the light of its mandate, the corporate goals, and their relevance in terms of contribution to national development.

**Technologies/Products Developed and Transferred**

In terms of numbers the institute claims the development or improvement of about 5 products/technologies per year over the years 2008 to 2011. It is possible to identify these products, and some of which are indeed of a very useful nature such as the PC based oscilloscope, but some others would beg the question as to the justification for undertaking such

projects in relation to the mandate of the Institution. It is also possible to identify some projects (traffic light development) which have catalysed further technology development/acquisition ending up with on-the-ground use of such technologies, but is a bit disappointing note that continued use of ACCIMT technology is lacking even in such instances. What is more of a concern is the lack of success in transferring such technologies/products to the industry and the country.

**Industry Services**

Primary areas of providing services can be categorised into two: 'Testing, Measurement and Calibration Services' and 'Consultancy Services'. It is apparent that this is one of the success areas of the Institute. The institute is well geared, to undertake testing, measurement and calibration services, and stakeholders clearly value this service. This is true for consultancy work as well. The consultancies are largely based on repair and hardware recovery work plus some software development work undertaken for public sector institutions. A notable success in the recent past is the recovery of advanced control systems for locomotive engines, enabling the re-commissioning of the engines with very considerable savings for Sri Lanka Railways and the national economy.

The stakeholder comments on these services were very complementary and a common thread that evolved is that the Institute must make the services they provide better known to the public and the industry so the contribution can be more significant. Clearly staff constraints play a role here as well, but the competency and motivation of the limited number of people and their expertise is to be commended.

While there is a designated Industry Services Division providing the primary testing and measurement services, other divisions too undertake similar work depending on where the relevant equipment is housed or the past contacts of the client with the Institute. Based on Corporate Goal 2 of developing a Centre of Excellence in 'Testing and Measurement Services' and the objective of establishing a Strategic Business Unit, and the current thrust to develop revenue earning services, the current structure and the practices do not lend itself to optimal use of human and other resources. A consolidated service providing unit, drawing in resources from relevant divisions may reduce the administrative load of the individual divisions, and result in a more effective service being provided.

**Continuing Professional Development Programmes**

It is noted that about 10-15 different courses/workshops/training programmes are held in a year of which half can be classified as continuing professional development courses, while the rest are more basic/intermediate level courses. The courses are well participated and considered a success in general. It is perhaps desirable to introduce more advanced courses, but the staff constraint can be quite an impeding factor in this exercise. The usefulness of continuing with the basic/intermediate courses however will need to be evaluated by the institute. As this is an important part of the mandate, this has to be made a core activity in planning for the future. It is also worthwhile to consider this as a centralised service, which will do all the planning, promotion, coordination and implementation activity with the resource people drawn from different divisions. This might lead to better focus on the activity and turn out to be more resource efficient.

**Information Dissemination and Extension Services**

The Institute's record of publications in reviewed journals is not quite good. Nor is the development of training manuals, advisory leaflets and other extension material. Some participation in conferences and presentation of material is noted, but clearly some improvement is needed here as well. Communications to policy makers in terms of policy briefs, to the public through newspaper articles, to the industry through targeted communications is somewhat lacking. This is indeed a common failure of most of our S&T institutions, and in spite of the realisation, the resources are very rarely directed towards this activity in an adequate manner by most of our Institutions. As the staff issue gets solved gradually, the Institute should consider this as an important area that needs attention.

## III. Management Aspects

**Programme Planning, Project Identification, and Implementation**

It is evident that the projects undertaken are more oriented towards product development and not technology development. One would expect the Institute to have identified clear Thrust Areas of technologies or sub-technologies to address as nationally important areas, and develop a programmatic approach to their development with projects/sub-projects fitting into these in a consistent manner. Instead, the projects undertaken appear quite disjointed, and more often than not based on individual preferences of the researcher/engineer, perhaps sometimes with some feedback from the industry. No evidence was available to suggest a structured process for programme/project development which should also take into consideration formal stakeholder inputs/feedback, and some degree of brainstorming/consultation. This would help develop more relevant programmes and projects with stakeholder involvement from the beginning, enabling more effective extension and utilisation of the developments.

Approval process of projects is limited to discussions between the researcher/Head of Division/Head of Technology and the Director/CEO, and final Board approval in some instances. It was not clear how the resource allocation was managed without a formal structured process.

Project monitoring is by the Head of the Division on a day to day basis with some periodic involvement of the Head of Technology. The project progress is expected to be discussed at the monthly management meetings, but it is clear from the minutes that with the day to day management issues taking priority, this forum is inadequate for a formal review of the progress of technical activities in detail. A summary report is however prepared and presented to the Board every month, but it is doubtful whether the Board can devote adequate time to review the projects in sufficient detail at their monthly Board Meetings.

**Technology Transfer and Extension Services**

This is clearly a very weak area of the Institute. Apart from some technological innovations that had dissipated through consultancy work, no evidence of a noteworthy high-level technology transfer event/situation was noted during the review. Some of the products developed appear to be good for commercialisation, but the attempts by the Institute to call for expressions of interest and transfer such technologies/products for industrial application have met with only very limited success. It was also noted that the current linear transfer process, frequently with

little ownership and communication after handing over the completed project to the Industrial Relations Division, is not quite adequate to ensure successful transfer. This suggests a need for a full review by the management of the approach adopted for technology transfer and to identify more effective, perhaps multiple routes of proactively pushing the technologies out to end users. Clearly more emphasis on stakeholder involvement at early stages of the projects will also enable effective transfer and adoption by the end users.

**New Technology Thrusts**

The institute has identified the need to introduce and address areas such as space technologies, and robotics in addition to what they are doing now. This is a good approach, as the mandate requires the Institute to work on modern technologies, rather than working on mature established technologies that can be handled by other public sector and private sector bodies in the country. What was lacking however was a document on these planned introductions that comprehensively justify the approach and address the related issues and outline a plan of action for effectively achieving the end results. Along with these introductions, there is a need for the institute to review the relevance of some of its current activities and make use of the opportunity to restructure the organisation for more effective delivery. Other technology areas outlined in the mandate, i.e. photonics and advanced materials, are not yet addressed, and this is quite understandable due to resource constraints.

**Collaboration and International Partnerships**

Organisations such as this should thrive on effective collaborative activity. Collaboration between divisions, between the Institute and the external stakeholders such as the industry and universities, can lead to multiple synergistic benefits with enhanced end results, including effective technology transfer. It is apparent that the culture of the institute does not promote this approach, and a very vertically structured approach is adopted in the implementation of projects apart from a handful of situations with limited inter-divisional collaboration. Joint projects with external partners were not existent save for one.

While some activity towards establishing international partnerships was noted, far more proactively developed initiatives should be in place as the main conduit of bringing in modern technologies into the country. International Partnerships are essential in this respect.

**Human Resource Management**

Clearly the staff strength, which is less than even 50% of the cadre is a major issue and has a big impact on the operations of the Institute. Recruitment and retention of staff is a major problem. It is however felt that the Institute should spend more time and vigorously develop plans to alleviate this problem. Remuneration levels clearly is at the base of this problem, and it is commendable that the Institute is taking proactive measures to work on this and also develop incentive schemes to compensate for the deficiencies. But the rest of the factors if addressed might alleviate the effects of this problem to at least some extent. More structured personal development plans for new recruits, joint academic work with Universities, closer guidance and supervision are perhaps some of these which the Institute can take note of. While salary is a big issue, the institute should aim to address other motivational factors effectively.

Staff loss also amounts to a knowledge loss, and again the institute needs to address this more effectively by reorganising various working arrangements.

**Management Information Systems**

As far as the review team could gather there is no Management Information System within the organisation. Clearly the Director/CEO monitors and reviews the organisational status regularly, but the staff as a body should be more aware of the progress in general and more specifically in relation to their own activities – both operationally and financially.  It was noted that although the researchers provide the necessary information their awareness of their own project expenses and costing of various programmes and services was inadequate. Finance Division has all the relevant information, but it needs to be made available to the researcher in a clear and concise manner regularly.

# 6. The Findings and Recommendations

The Institute had operated under serious constraints of staff numbers and quality over the last five years or more. Funds allocations are less of a constraint as the limiting factor is staff, although delays in funds disbursement from the Treasury had affected the smooth functioning of the Institute. The achievement of targets and overall outputs is seriously affected partly due to these constraints, but inadequacies of the management processes also have contributed towards the modest performance.

Overall, although the Institute has worked towards achieving the Corporate Goals, it is the opinion of the review team that the degree of success is somewhat variable and in general inadequate. Apart from isolated instances of significant input to the national economy, in general the expectation in terms of contribution is only partly achieved. The achievements in 'Testing and Measurements Services' are good, with good feedback from those stakeholders who received the services. Same appears to be the case in providing general 'Consultancy Services'. CPD programmes are well valued by the training recipients, but again, a wider more broad based, proactive programme is desired. However, in terms of R&D and innovation work, and transfer of such technologies to the industry, the achievements are quite inadequate.

While significant resource input and increased autonomy will clearly enhance the performance, the following recommendations are made to enable increased effectiveness in the delivery of the expectations within these resource constraints. The need for increased autonomy to ensure better planning and implementation by the Institute, with reduced delays and more accountability cannot however be over-emphasised, enabling it to acquire a more dynamic outlook.

## I. Strategic and Corporate Planning

- The Corporate Planning process needs to be strengthened substantially with a structured process with the use of external expertise as necessary, particularly in view of staff resource constraints. The process should ensure more comprehensive Board direction and stakeholder consultation. Corporate plan should be updated annually on a rolling basis considering national policies, external and internal environment and reviewing the organizational policies and strategies.

- Centralisation of units providing services in terms of testing, calibration and consultancy services, with resource persons drawn from respective Divisions where necessary, will lead to more effective resource utilisation and delivery. A similar approach may be adopted in the provision of the Continuous Professional Development services. A restructuring exercise based on this approach may be considered in the development of the next Corporate Plan.

- Strategies to develop international partnerships should be addressed particularly for ensuring exposure and knowledge transfer in modern technologies as well as for raising donor funds.

- Annual Action Plans should be more aligned to the Institute's Corporate Plan.

## II. Programme Planning, Project Identification, and Implementation

- The orientation of developing disconnected projects largely identified at Division level needs to be changed and a programme led approach has to be established. The Institute should clearly identify a limited number of programmes based on prioritised thematic thrusts addressing national technology needs identified in the Corporate Plan, and develop projects fitting into these programmes.

- Multidisciplinary projects, partnership with private sector and universities, and international collaboration should be encouraged in programme/project planning.

- Existing project proposal approval procedure needs to be reviewed and improved to clearly address the relevance, significance, outputs and resource needs to enable prioritisation within the constraints so as to ensure timely delivery of expected outputs. Similar improvements are necessary for project monitoring, review and quality assurance.

## III. Technology Transfer and Extension Services

- The inadequacies of the current linear technology transfer/extension process (Technology Division to Industrial Relations Division to the Client) suggest a need for a full review by the management of the approach adopted. More effective, multiple routes of communication and dissemination of outputs should be employed to proactively push the technologies to clients and end users. On the other hand, more emphasis on stakeholder involvement at early stages of the projects should be encouraged to enable effective transfer and adoption by the end users.

- It is also recommended that this aspect is comprehensively addressed in the development of the new Corporate Plan, identifying the needed strategies.

- The institute should also pay due regard to the need for intellectual property protection, through patents, appropriate licensing agreements and other means.

## IV. Human Resource Management

- *Recruitment:* In addition to following the now approved SCC/DMS guidelines on recruitment, a degree of innovative lateral thinking has to be exercised in filling the senior level positions in order to ensure proper guidance of junior staff/the likely new recruits; for example by way of university secondments, sabbatical appointments, industry sponsored research fellows, and similar fixed term contracts.

- *Training:* A training programme and a calendar needs to be established based on a systematic training needs analysis and implemented together with the performance management system, as opposed to the currently practiced system largely based on opportunities.

- *Performance Management:* It is recommended to establish an ongoing Performance Management system in relation to agreed objectives, facilities available, training needs,

and agreed performance indicators with at least two comprehensive dialogues between the superior and the subordinate during the year. Personal performance parameters must be derived from the organizational performance objectives in the Corporate Plan.

- *Staff retention:* In addition to the significant issue of the poor salary structure which is being addressed, the management should formally examine possible approaches to ensure improved job satisfaction, appropriate guidance, opportunities for postgraduate education, improved working environment, good HR practices and other similar motivational factors which will help address this burning issue to some extent.

## V. Documentation, Knowledge Management and Management Information System

- The process/procedure documentation needs to improve to ensure consistency, transparency and accountability of all the Institutional activities.

- The issue of loss of knowledge with the loss of staff has to be addressed by developing appropriate novel methodologies for project implementation by encouraging team approaches. Good technical documentation and developing opportunities for knowledge sharing through research meetings/seminars, and developing an IT based knowledge management system is recommended.

- A fully fledged IT based MIS should be designed, developed and installed at ACCIMT to improve decision making by the management through availability of timely and accurate information as well for the exchange of information among Divisions and staff members.

## VI. Communication and Information Dissemination

- The methods employed to communicate with the Clients and other stakeholders need to be expanded with more publications such as newsletters, policy briefs, books, information leaflets and brochures. The website needs to be improved with more detailed information and feedback mechanisms with facilities for inquiry.

- Encouraging publications in reputed refereed journals are other means recommended for knowledge management.

- A strengthened corporate communication/media unit is recommended to follow up such activities in a focussed manner.

## VII. Organisational Assets

- It is recommended to develop strategies and processes, and encourage staff to actively explore alternate donor funding opportunities in future R&D planning in order to be less dependent on treasury grants. This will also improve international partnership activity essential for keeping up to date with cutting edge technologies.

- Strategies to minimise knowledge loss along with staff loss, by innovative ways of working, particularly within the technical divisions, is required.

- A culture of patenting as a means of intellectual property protection need to be developed and promoted.

# Appendix 1: Management Assessment

## I. Assessment of institutional response to external and internal environment in planning organizational strategies

| Management practice | Level of practice (Performance Indicators) | | | Comments/Evidence |
|---|---|---|---|---|
| | Strong | Moderate | Weak | |
| Government policies and development goals are used /considered to establish goals and plan organizational strategy | | × | | Government S&T policies are considered in establishing goals |
| Organizational mandate (as specified by the relevant act) is considered in strategic planning | | × | | Considered to a limited extent |
| The institution is responsive to changes in government policies and strategies | | × | | Setting up of the Space Technology Division is in line with Govt strategy |
| Factors such as strengths, weaknesses, threats and opportunities are considered in strategic planning | | × | | |
| Stakeholder needs are taken in to consideration in strategic planning | | | × | No formal stakeholder consultation |
| The Board of Governors is involved in strategic planning | | × | | BoG provides some inputs to Corporate plan |
| The extent to which staff members are involved in strategic planning | | × | | Only HODs involve but no other staff |
| Government allocations and alternative funding opportunities (donor funding) are considered in strategic planning | | × | | Only Govt grants are considered but no other funding opportunities |
| The extent to which policies and plans of the organization are reviewed and updated | | | × | Corporate plan is not updated annually on rolling basis. |

## II. Planning S&T programs and setting priorities

| Management practice | Level of practice (Performance Indicators) | | | Comments/Evidence |
|---|---|---|---|---|
| | Strong | Moderate | Weak | |
| National development goals are considered in planning programs & setting priorities | | × | | Many are individual projects and not linked to specific National program |
| Board of Governors participate in planning and priority setting of program | | × | | BoG s inputs are available in planning but no prioritizing procedure |
| The extent to which the staff of the institution participate in program planning and priority setting | | × | | Only HODs involve but no other staff |
| Stakeholder interests are considered in program planning | | | × | Very informal way of receiving feedback |
| The extent to which programs are planned and approved through appropriate procedures | | × | | No comprehensive project proposals prepared. No structured procedure. |
| The obtaining of necessary equipment is considered in planning programs | | × | | |
| Stakeholders are represented in the institutions planning & review committees | | | × | No forum for such consultation |
| The extent to which socio economic and commercialization aspects are considered in program planning | | | × | Not adequate attempts on technology transfer of end results |
| Effectiveness and efficiency of institutional procedures in approving new S&T programs. | | | × | A proper approval process need to be established |

## III.    Planning  S& T /  R& D  Projects

| Management practice | Level of Practice (Performance Indicators) | | | Comments/ Evidence |
|---|---|---|---|---|
| | Strong | Moderate | Weak | |
| The staff is provided with guidance for project planning | | | X | No standard procedure |
| Previous research results/data are used for planning projects | | X | | Past data were used in Traffic light and locomotive projects. |
| The extent to which the institution follows a formal process for preparation, review and approval of projects | | | X | No evidence for formal process |
| The extent to which  organizational plans (e.g. medium-term plan, corporate plan, strategy etc.) are used to guide project selection and planning | | X | | Project ideas developed in division based on individual interest, guidance are given by corporate plan for certain projects |
| Multidisciplinary projects/ activities are encouraged by the institutions | | | X | No evidence for multidisciplinary projects |
| Foreign collaborations are encouraged and incorporated in planning. | | | X | No evidence for foreign collaboration except a mini project |
| Partnership with private sector is encouraged by the institution | | X | | Mainly for short-term consultancies |
| The extent to which  development research/activities are considered in planning projects | | X | | Most of the projects are development research |
| The extent to which  basic research are considered when planning projects | | X | | Most of the projects are development research, few basic research projects are undertaken in Astronomy Division. |
| The degree to which adverse effects on environment are considered in planning projects | | X | | Environment related projects are in project portfolio  E.g.  irrigation project & Solar powered street lamps |

## IV. Project management and maintenance of quality

| Management Practice | Level of Practice (Performance Indicators) | | | Comments/ Evidence |
|---|---|---|---|---|
| | Strong | Moderate | Weak | |
| The effectiveness of the procedures for resource allocation at different levels (organization, departments, program etc.) | | X | | No evidence of formal procedure. Staff is largely the limiting factor. Projects are initiated based on available resources. |
| Ensuring that instruments, equipment and infrastructure facilities are sufficient for implementation of projects | | X | | |
| The effectiveness of administrative procedures and support for project implementation (procurement and distribution of equipment and materials, transport arrangements, etc.) | X | | | Researchers are happy with procedures and no issues were raised. |
| Formal monitoring and review processes are used to direct projects towards achievement of objectives | | | X | Taken up at the management meeting which is not focused towards monitoring projects. |
| The extent to which the researchers are supported by the required technical / field staff. | X | | | Adequate staff support |
| Ensuring that established field / lab methods, and appropriate protocols are used | X | | | Stakeholder's comments are positive. |
| Research projects/ S& T activities are completed within the planned time frame. | | X | | Project Gant Charts are used, but some delays were noticed. |
| Ensuring that scientists / researchers have access to adequate scientific information (scientific journals, internet, international databases, advanced research institutes, universities etc.) that strengthens the quality of research. | X | | | Subscribed required journals. IEE digital library access available. |

| | | | | |
|---|---|---|---|---|
| The extent to which quality assurance practices are followed by the institutions | | | X | No quality assurance procedures except accredited labs. |
| Ensuring that researchers/ scientists have access to computers and necessary software | X | | | |

## V.    Human Resource Management

| Management Practice | Level of Practice (Performance Indicators) | | | Comments/Evidence |
|---|---|---|---|---|
| | Strong | Moderate | Weak | |
| The institute maintains and updates staff information in a database ( including bio data, disciplines, experience, publications, projects) | | X | | Personal files are updated and are in order |
| The institution, plans and updates its staff recruitments based on programme and project needs | | X | | Recruitment was not possible except entry level Engineers of late this year |
| The effectiveness of the selection procedures and the schemes of recruitment | | X | | Now approved  SCC/DMS guidelines are available but hardly any innovative lateral thinking |
| Training is based on institution and programme objectives and on merit | | | X | there were no training calendar for the staff no evidence of TNA |
| The effectiveness of the procedures in promoting a good working environment and maintain high staff morale | | X | | Dearth of competent supervisors for guiding the junior staff  Sharing of consultancy proceeds  Housekeeping and Safety |
| The effectiveness of staff performance appraisals | | | X | What is in place is traditional Performance appraisals and this is generally considered as a very rudimentary process |
| The effectiveness of rewards and incentive schemes in motivating the staff | | X | | Sharing of consultancy proceeds are in place but not adequate |
| The effectiveness of managing staff turnover, absenteeism and work interruptions | | | X | No HR audits, and strategies not developed |

## VI.    Management of Organisational Assets

| Management Practice | Level of Practice (Performance Indicators) | | | Comments/Evidence |
|---|---|---|---|---|
| | Strong | Moderate | Weak | |
| The ability of the Institute to carry out its mandate and the assigned statutory powers | | X | | Lack of relevant staff is a major problem |
| Infrastructure ( buildings, stations, fields, roads) is satisfactorily maintained | | X | | |
| Vehicle and equipment (lab, field, office) are properly managed and maintained | | X | | The institute has 8 vehicles and 5 drivers. In the absence of drivers they go for hiring outside vehicles which cost them around Rs 50,000/-per month. Office need more attention on housekeeping |
| The effectiveness of procedures to ensure that equipment are in working order | | X | | Service agreements are maintained |
| The effectiveness of the institute's overall strategy in generation and proper utilization of funds | | X | | The institute is capable of generating much more funds if they really keen about but in the absence of marketing or commercialization fund generated remains a bare average. Utilization is of course satisfactory. |
| The extent to which the institution identifies opportunities for income generation and cost recovery | | X | | Ad hoc & definitely need to strengthen. The scope is much more & need to venture in to it |
| The extent to which the intellectual property rights of the institute are protected | | | X | It seems that 'not getting Patents' is the culture which is definitely a misconception. There are so many lost opportunities |

## VII. Coordinating and integrating the internal functions/activities

| Management Practice | Level of Practice (Performance Indicators) | | | Comments/Evidence |
|---|---|---|---|---|
| | Strong | Moderate | Weak | |
| The extent to which institution is evaluated internally and restructured based on current needs | | X | | Introduction of new organizational structure and a staff cadre in year 2009 (Annual report 2009). Establishment of Robotics Laboratory (Annual report-2008, Annual report – 2009 and Annual report - 2010). |
| The effectiveness of internal communication and coordination mechanisms | | X | | Mainly within the individual divisions. The HOT coordinates the inter-divisional activities and HOT links individual division to the BOG. Email and paper based communications can be seen. |
| Institution's overall direction and coordination are provided by a central planning committee/ unit | | X | | Board of governors and Management committee provide some directions. Research projects identifications are mainly done at the technical divisions based on the interests and capabilities of research engineers and scientists and submit for approval of the BOG. |
| The extent to which different units are assigned clearly defined functions | | X | | There are some overlapping areas among technical divisions: Electronics and IT, Electronics and Communications for example. |
| Responsibilities of research / management staff clearly identified | | | | Now developed based on SCC guidelines, to be implemented |
| Effectiveness of using appropriate reporting procedures and feedback in management at different levels | | | X | No such reporting mechanisms or well defined report formats exist. No feedback forms or email address of contact person available in ACCIMT official Web site (http://www.accimt.ac.lk/index.html). |

## VIII.    Partnership in managing – Information dissemination

| Management Practice | Level of Practice (Performance Indicators) | | | Comments/ Evidence |
|---|---|---|---|---|
| | Strong | Moderate | Weak | |
| The institution *systematically plans* and performs dissemination of information | | X | | Goals and objectives have been set in the corporate plan 2008-2012. The program 8.6.1.1 in page 19 of the corporate plan 2008-2012 states "In keeping with the corporate plan, prepare a 'Year Plan' annually for the Institute and monitor its implementation", however, only the action plan 2012 is available. Action plan 2012 does not reflect the goals and objectives set in the corporate plan. Annual reports for year 2008, year 2009, and year 2010 provide information about implementation about few goals and objectives. However, majority of them have not been implemented. Lack of human resources may be a reason. |
| The extent to which the institution *plans and maintains linkages* with key partners for sharing and dissemination of information | | X | | No proper mechanism to identify potential stakeholders for collaborative R&D works. Collaborative research projects in space sciences with the Department of Physics, University of Colombo (Annual report-2008 and Annual report - 2009). Introduction of collaborative research work leading to PhD Degree with University of Moratuwa in year 2009 (Annual report - 2009). Collaborative research projects undertaken in the area of Astronomy with the undergraduate programmes of the University of Colombo, University of Sri Jayawardenapura and Sabaragamuwa University (Annual report – 2009 and Annual report - 2010). RS & GIS project in collaboration with the Disaster Management Centre (DMC) (Annual report – 2009). Formulation of Inter-Agency collaborative network among the public sector agencies to work with ACCIMT to promote remote |

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|---|---|---|---|---|
| | | | | sensing and other space technology applications (Annual report – 2009). Localizing Mozilla Thunderbird and Firefox in collaboration with the University of Moratuwa (Completed in 2010) (Annual report – 2010). |
| The *effectiveness* of institutional *procedures for technology transfer* | | | X | No proper mechanism (procedure) for technology transfer and there is no central coordinating point. The official Web site of ACCIMT lists technologies available for transfer (http://www.accimt.ac.lk/technology_transfer.htm, accessed 1/10/2012). However, it does not provide any information about the procedure for technology transfer.<br><br>The following technology transfer/information dissemination programs were found in Annual reports.<br><br>Four workshops on computer hardware engineering, antenna design and mobile phone repairing under the Vidatha technology transfer program (Annual report – 2008 and Annual report - 2009). Continuing Professional Development (CPD) training programs: Embedded Control Systems and Modern Electronic Test & Measuring Instruments with Digital Emphasis (Annual report- 2008, Annual report- 2009 and Annual report - 2010). Basic and Intermediate Level Technical Training programs: Computer hardware engineering course (CHEC), Practical Electronic course (PEC), Mobile Phone repairing (Annual report – 2008, Annual report – 2009 and Annual report - 2010). Vidatha programs and Training programs on Astronomy & Space Science (Annual report – 2008, Annual report – 2009 and Annual report - 2010). Science & Technology popularization and information dissemination programs Annual report – 2008, Annual report – 2009 and Annual report - 2010). Exhibitions, National conference on geo informatics applications in Sri Lanka 2008 and publications (Annual report 2008, |

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|---|---|---|---|---|
| | | | | Annual report – 2009 and Annual report - 2010).<br>Issuing of non-exclusive licenses to six parties for manufacturing and marketing PC based Oscilloscope Simulator as for commercialization of ACCIMT products (Annual report – 2009).<br>Issuing of non-exclusive license for Automatic Telephone Manager (Annual report – 2010). |
| The effectiveness of the system to obtain feedback from different types of stakeholders | | | X | No evidence for such process.<br>There is no evidence for stakeholder meetings. Ad-hoc stakeholder feedbacks to the R&D team. |

## IX.    Monitoring, evaluation and reporting procedures

| Management Practice | Level of Practice (Performance Indicators) | | | Comments/Evidence |
|---|---|---|---|---|
| | Strong | Moderate | Weak | |
| The institution monitors and evaluates (M&E) its own activities periodically | | | X | There is no formal procedure. Monitoring and evaluation of ACCIMT activities are performed to some extent at the management meeting (Minutes of the Management Meetings – 2011.05.13 and 2012.01.11). |
| M&E is supported by an adequate management information system (MIS), which includes information on projects (e.g. costs, staff, progress, and results) | | | X | There is no proper MIS. Costs and staff (Man months) are kept at the Account division and are available to the staff on demand. Results of the projects are maintained at the respective division. Knowledge gained through projects are often not managed properly (leading to knowledge drain). Properly documented project reports are not available in most cases. However, the Electronic division manages and keeps its project reports. |
| The extent to which S&T results and other outputs are adequately reported internally (e.g. through reports, internal program reviews, seminars) | | X | | Results and outputs are reported to the Head of Division by research engineers/ scientists and then to the management committee. There are no internal progress review meetings except the management meeting. |
| External stakeholders contribute to the M&E process in the institution | | | X | No evidence for such process. There is no evidence for stakeholder meetings. Ad-hoc stakeholder feedbacks to the R&D team. |
| The extent to which the results of M&E are used for projects/ research planning and decision making | | X | | To some extent by experience. No evidence for such a formal process. ACCIMT experiences heavy staff turnover. Projects are discontinued and Knowledge gained is usually not retained when the person responsible leaves ACCIMT. |

# Appendix 2: The Terms of Reference of the Review Panel

## National Science and Technology Commission

## External Review of the Arthur C Clarke Institute for Modern Technologies
## Terms of Reference

### *Objectives*

The Science and Technology Development Act No. 11 of 1994 mandates the National Science and Technology Commission, *inter alia*, to review the progress of science and technology institutions in relation to the Objects set out in section 2 of the Act (see Appendix)

Accordingly, this review is carried out with the Objective of determining the progress of the Arthur C Clarke Institute for Modern Technologies in achieving such of these Objects as are relevant to it, to assess the quality, cost effectiveness, relevance, and impact, of the scientific programmes conducted at the Institute, and to ensure that the needs and expectations of the government and other stakeholders are being met to the fullest extent possible.

*The review may also serve*

- To obtain information on how to improve the activities of the Institution
- To induce self-reflection by the scientists at the Institution on the results and outcomes of S&T activities
- To encourage good management of the Institution
- To improve internal and external transparency
- To recommend future resource commitments
- To gather information for policy change
- To inform stakeholders about the Institute's competencies.

### *Duties of members of the Review Team*

Members of the review team are expected to follow the procedures described in the Review Manual prepared by NASTEC.  This includes:

1. Study of the self-assessment report submitted by the Institute (ACCIMT).  NASTEC will provide you with a copy of this report. While the review is based on the information contained in this report, it need not be confined to the report.

2. Site visit to the Institute after preliminary discussions with the Director of ACCIMT.  You may have to examine previously requested documents, and interview relevant officers, in order to gather information necessary to evaluate the institution. Transport will be provided by NASTEC.

3. Meeting with stakeholders of the Institute, in order to determine whether their expectations are being reasonably met by the Institution.  The meeting will be set up by NASTEC in consultation with the ACCIMT.

4. Preparation of the draft report and submission of the same to the Director, ACCIMT, for his comments.

5. Preparation of the final report and submission of the same to NASTEC.  After the comments of the Director, ACCIMT, on factual matters of the draft report have been received and given

due consideration, the Chair of the Review Team will be responsible for finalizing the report, in consultation with the other members of the ream.  The final report will be circulated by NASTEC to all relevant parties.

The draft and final reports should contain assessments of both the management and output of the Institute, covering all areas included in the Review Manual to the extent that they are applicable, and submitted in the format described in page 29 of the Review Manual.  The team may use its discretion in dealing with any additional matters not covered by the Review Manual, which in their opinion are relevant and important for purposes of this review.  This should be done with proper documentation and justifications.

The member of the team should always bear in mind that, while the review report must address the needs of all concerned parties, such as policy makers, the relevant line Ministry, and the Treasury, its most critical function is to guide the Institution being reviewed towards self-improvement, at the institutional, project, and individual levels.  It should be based on the Institution's mandate, and contain constructive criticisms, an unbiased analysis of the findings, and recommendations for improvement.

**Appendix: Section 2 of Act No. 11**

(a)    to promote the use of science and technology as an integral part of the effort to achieve rapid economic development, and improved quality of life and to alleviate poverty, and to involve scientists and technologists in the formulation of policy and in decision making ;

(b)    to foster scientific and technological activity in all its aspects with a view to developing self reliance in scientific and technological capability and to ensure the allocation of a reasonable proportion of the gross national product for science and technology activities;

(c)    to support the development of indigenous technology wherever feasible whilst promoting the import, adaptation and assimilation of technology for rapid growth in industry agriculture and services;

(d)    to ensure that institutions of higher education and technical education and research institutions produce scientists, technologists and technicians of high caliber and competence and to secure the provision of incentives to them with a view to ensuring their retention in Sri Lanka;

(e)    to provide adequate opportunities for all persons to acquire a basic education in science and its practical applications:

(f)    to cultivate among the people, an appreciation of the value of science, scientific method and technology and of the integral role that science plays in modern society;

(g)    to disseminate the benefits of science and technology activity to all sectors of the people;

(h)    to encourage and strengthen cooperation in science and technology between scientists in Sri Lanka, and between scientists in Sri Lanka and scientists outside Sri Lanka, and to provide access to global scientific and technological knowledge and activity ;

(i)    to develop the capability to continuously plan, evaluate and review strategies, legislation: and the institutional framework for science and technology in Sri Lanka ;

(j)    to identify priority areas of science and technology likely to be of benefit to Sri Lanka and to promote research and development in such areas.