



Flemish University Council – University Development Cooperation (VLIR-UOS)
Programme for Institutional University Cooperation (IUC)

Final evaluation of the IUC partner programme with the Escuela Superior Politécnica del Litoral (ESPOL), Ecuador

FINAL REPORT – March 2010

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Abbreviations

BSU	Benguet State University - Philippines
BTC	Belgian Technical Cooperation
CADS	Centre for Water and Sustainable Development
CEEMP	Centro de Desarrollo de Emprendedores, Entrepreneurial Development Centre
CENAIM	Centro Nacional de Acuicultura e Investigaciones Marinas
CERA	Centro de Energía Renovable y Alternativas
CEREPS	Fondo Especial de Reactivación Productiva y Social del Desarrollo Tecnológico-Científico y de Estabilización Fiscal
CIBE	Centro de Investigaciones Biotecnológicas del Ecuador
CICYT	Scientific and Technological Research Centre
CIDIS	Centre for System Research, Development and Innovation
CIDNA	Centro de Investigación y Desarrollo de Nanotecnología
CONACYT	Consejo Nacional de Ciencias y Tecnología
CONEA	Consejo Nacional de Evaluación y Acreditación
CONESUP	Consejo Nacional de Educación Superior
CTI	Centro de Tecnologías de la Información
CTU	Can Tho University – Vietnam
CVR	Computer Vision & Robotics
EJE	Junior Enterprise Evolution
EMSAA	Environmental management systems in agriculture and aquaculture
ESPOL	Escuela Superior Politécnica del Litoral
FICT	Earth Science and Engineering
FIMCP	Mechanical Engineering and Production Sciences
FWO	Fonds voor Wetenschappelijk Onderzoek Vlaanderen (Flemish Scientific Research Fund)
FUNDACYT	Fundación Nacional de Ciencias y Tecnología
HEI	Higher Education Institutions
HUT	Hanoi University of Technology - Vietnam
IUC	Institutional University Cooperation
LEMAT	Laboratorio de Ensayos Metrológicos y de Materiales
MSc	Master of Science
Nuffic	Netherlands Organization for International Cooperation in Higher Education
PARCON	Parco del Conocimiento, Knowledge Park
PhD	Doctor of Philosophy
RIP	IUC Research Initiative Programme
S&T	Science and Technology
SAEMA	Sistema de Alerta Epidemiológico y de Manejo Acuícola (Warning System for Epidemics and Water Management)
SENACYT	Secretaria Nacional de Ciencias y Tecnología
SENPLADES	National Secretary for Planning
SLU	Saint Louis University – Philippines
UMSS	Universidad Mayor de San Simón - Bolivia
UoN	University of Nairobi - Kenya
UOS	Universitaire Ontwikkelingssamenwerking, University Development Cooperation
UZ	University of Zimbabwe
VLIR	Vlaamse Interuniversitaire Raad, Flemish Interuniversity Council

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Foreword

This report contains the findings, conclusions and recommendations of the final evaluation of the VLIR-UOS Partner Programme (1999-2009) with the Escuela Superior Politécnica del Litoral (ESPOL) in Guayaquil, Ecuador. The VLIR-UOS programme for Institutional University Cooperation (IUC) is an interuniversity cooperation programme of Flemish universities that started in 1999. Based on a system of programme funding provided by the Belgian government, the IUC is directed at a limited number of partner universities in the South. Each partnership, covering two five-year periods, consists of a coherent set of policies and actions aimed at the improvement of the teaching, research, and service functions of the partner university, as well as its institutional management.

A midterm evaluation and a final evaluation are set up for each partnership. These evaluations are done by an external evaluation commission, consisting of an expert in international collaboration (and higher education) and a country expert. In this case, the team consisted of Dr. Wietse de Vries, Senior Researcher in higher education policies and Director of Educational Management at the Benemérita Universidad Autónoma de Puebla, Mexico, as country expert, and Drs. Jolie Franke, Senior Project Administrator Capacity Building Programmes of the Netherlands Organization for International Cooperation in Higher Education (Nuffic), the Netherlands, as international expert.

The work of the commission was guided by detailed Terms of Reference provided by VLIR-UOS and builds on a self evaluation that precedes the external evaluation. In this self assessment, the project leaders as well as the two programme coordinators evaluated the results and successes of the projects and programmes based on questionnaires and formats provided by VLIR-UOS.

This report, however, represents the views of the external evaluation commission and does not necessarily reflect the opinions of VLIR-UOS or ESPOL. On the other hand we would like to stress, that our recommendations in some cases may confirm what ESPOL already is aware of and in several occasions coincides with ESPOL future plans and/or institutional policy.

The external commission was properly briefed by VLIR-UOS about the evaluation and the programme prior to the field mission. The commission had also access to documents generated during previous evaluations, and to detailed information on the programme and its activities.

The commission wants to point out the professional way in which the evaluation was organised by the VLIR-UOS office, in particular by Christophe Goossens.

We also would like to express our gratitude to all the individuals we interviewed during the course of the evaluation. We would like to thank the project team leaders, programme management staff, programme coordinators and all other personnel involved in the programme for their excellent and straightforward collaboration. We also thank the Rector of ESPOL, Dr. Moisés Tacle and the local Programme Coordinators, Ing. Sergio Flores and Dr. Jorge Calderón, for their clear-cut participation in the discussions during the evaluation and the hospitality we received during our stay at ESPOL. A special appreciation concerns Ing. Diana Bloise for the smooth organization of our stay and her assistance in our work.

Executive summary

The results of our evaluation can be summarized in the following way:

The ten years of cooperation between ESPOL and various Flemish partner universities under the VLIR-UOS Institutional University Cooperation Programme effectively lead to a substantial strengthening of the Ecuadorian partner, especially in terms of establishing an institutional research culture and strengthening various decentralised research centres.

The programme was designed departing from specific demands identified at ESPOL and by ESPOL staff, which were complemented with accurate expertise from Flemish experts through an 'ESPOL-driven' match-making exercise. The first phase consisted of six components which were broadened in the second phase through an open call for proposals in ESPOL. The second phase consisted of eight components, as three new components were added and one first phase component was not fully continued, but partly hosted within component 1 for the second phase. Although in general all components have been rather successful, the components that were only started with the second phase are comparatively somewhat lagging behind in terms of institutional consolidation. This, in our view, confirms the importance of the long-term commitment from the IUC programme.

The evaluation commission was impressed by the professional way the cooperation programme had been managed both in Guayaquil and in Ghent. This refers to the transparent and swift on-line financial information system; the strong but democratic leadership by the local programme coordinators; the vivid monthly meetings of the local steering committee; the strict application of the VLIR procedures though allowing for flexibility and adjustments; and the swift and respectful way the Ghent programme management responded to the needs of the programme. This, combined with a strong commitment by ESPOL authorities and a stable, well-organised and non-politicised institution, contributed much to the efficiency and effectiveness of the programme.

The overall and specific objectives of the IUC programme were respectively 'Empowering local university as an institution to better fulfil its role as a development actor in society' and 'Generation of knowledge and services based on research in areas of impact for Ecuadorian development'. The IUC programme definitely contributed towards the overall objective and was rather successful in achieving the specific objective. ESPOL stands out in Ecuador in terms of quality in education and research. ESPOL is eager to constantly improve its quality for example through international accreditation processes and investing in (or searching funding for) improvement programmes. The IUC programme gave research culture and research practice at ESPOL a boost, and strengthened the CICYT Research Centre and various decentralised research centres. However, the writing of research results (especially for international peer reviewed journals) remains an obstacle for many ESPOL researchers.

The cooperation themes are all highly relevant for Ecuadorian development and can have a substantial impact on the private sector, national policies or society. They also align with national priorities as the Ecuadorian government explicitly expressed their interest in diversification of production in order to relieve dependency on oil income through the development of technology sectors and through academic cooperation.

In terms of sustainability we found positive factors as almost all PhD fellows have been reintegrated and received a permanent position as full professor. There are good institutional arrangements and development plans. However, the success of these plans depends on their implementation and successful obtaining of government funding. Almost in contradiction with the ambitious infrastructure and doctoral development plans, we found that some centres have a weak staff base in terms of labour conditions (temporary contracts and low salaries), which affected and will affect staff stability. On the positive side, we found that the new Higher Education policy is an opportunity for ESPOL as it gives priority to excellence and makes funds available for those institutions who distinguish themselves in terms of quality and initiative.

For the future we recommend that ESPOL strengthen the human resource base of the research centres, incrementing the number of researchers with post-graduate (preferably PhD) degrees and improving labour conditions of other staff, such as research assistants and technical personnel).

Research culture should further be stimulated, through a reorganisation of the Research Council and CICYT; further motivating transdisciplinary projects and stirring the publication of research results (preferably) in international peer reviewed journals. Spin off towards communities, the private sector and public policies should be strengthened. Post-graduate education at ESPOL should be further developed, in order to integrate and mutually enhance research and post-graduate education. ESPOL can and needs to develop MSc and PhD programmes in order to guarantee its future development.

We recommend Flemish and Ecuadorian partners to continue collaboration in the future. Indeed, concrete plans are already developed even including other Southern partners.

VLIR-UOS is recommended to continue strengthening the IUC programme by learning from experiences. VLIR-UOS has proven to be a real learning organisation, and the IUC programme has evolved and improved over time. Now that various IUC programmes have been finalised and externally evaluated, a meta-evaluation should be called for, in order to obtain information on decisive factors for success, effectiveness and sustainability in order to guide future calls. In the meantime, VLIR-UOS should maintain the strong elements of its IUC programme, such as the long-term commitment; the coherent approach combining strengthening at decentralised level with support at central level; the systematic organisation and procedures but at the same time relative flexibility; the use of competitive funds in order to promote excellence and cooperation between the programme components; the sandwich modality of postgraduate scholarship; the demand orientation and the promotion of Southern ownership. Some other aspects of the VLIR-IUC programme may deserve improvements, for example the influence of competition and institutional envy between the Flemish universities should be kept out of the cooperation programmes in the South.

1. Introduction

In 2009, the collaboration between ESPOL and VLIR reached its ten year benchmark. At this point, VLIR guidelines call for an outside evaluation of the impact of the several projects. In the previous years (8, 9 and 10) there has been a gradual downscaling of funding (to 50% in year 10) and at this point funding by the VLIR will stop. Several projects, however, may still be eligible for specific research funds (RIP) for an additional period of time.

Over the last ten years, the collaboration between ESPOL and Flemish universities, within the context of VLIR-UOS, has been geared towards capacity building for Research and Development. This has meant that between 1999 and 2009, emphasis has been placed on the education of Ecuadorian academic staff at the post-graduate level (mostly by studying at Flemish universities in 'sandwich' type of programmes), the development of research through the equipment of laboratories and research funds, and the joint work on international publications.

We will highlight here first the characteristics of the VLIR-IUC programme (Chapter 2) and then elaborate on the objectives and organisation of the external evaluation (Chapter 3). Chapter 4 relates to the Higher Education sector in Ecuador and to ESPOL in particular and introduces the VLIR-UOS/ESPOL cooperation programme. Chapter 5 reflects the evaluation findings at the individual projects' level, including project specific conclusions and recommendations and in chapter 6 an overall assessment at programme level is given. Finally, Chapter 7 contains the conclusions and recommendations on the programme level.

2. The IUC programme

The Flemish universities, through their national council (Vlaamse Interuniversitaire Raad, VLIR) operate an international cooperation programme (Institutional University Cooperation - IUC) with selected universities in less developed countries. It should be pointed out that the list of eligible countries is established by the Belgian government, and not by VLIR.

The IUC stands out from most other international collaboration programmes for several reasons:

1. Support is channelled to a limited number of centres for research in the partner university (in this case ESPOL) with the aim to establish a better focus, efficiency and impact of the programme.
2. Much weight is placed on the fact that collaboration should not be limited to funding research projects, but that the outcomes should include capacity building at the level of centres and the university as a whole. As such, IUC seeks to achieve internationally recognized research results, as an outcome of the collaboration between Ecuadorian and Flemish academics, but also to assist the university as a whole to improve its research capacity (by funding infrastructure and training future researchers) and its management of (postgraduate teaching) and research.
3. VLIR collaboration is non-competitive and long term. That is, projects are selected on the base of strategic development proposals by the host university, and collaboration considers a ten year time span of funding. The collaboration includes a midterm external evaluations, which might lead to the ending of specific projects, but in principle, collaboration will continue for ten years, with the possibility of an additional five years of specific competitive funding
4. Collaboration is a key aspect of VLIR funded initiatives. As such, outcomes of the several projects should be the result of the interaction between Flemish and Ecuadorian faculty and students.

The general objective of the Institutional University Cooperation (IUC) is *'Empowering the local university as institution to better fulfil its role as development actor in society'*.

The IUC Programme emanates from the Specific Agreement signed by the Belgian State Secretary for Development Cooperation and the VLIR-UOS on 16 May 1997. This agreement foresees a system of programme funding whereby, based on a Global Programme, the Belgian government provides each year funding for the implementation of an annual programme submitted by the VLIR-UOS. Once the government has approved the VLIR-UOS annual programme, it is the responsibility of the VLIR-UOS to implement the programme.

The IUC Programme has the following general features:

- Inter-university programmes (every IUC is a partnership of the Flemish universities with one Partner University in the South)
- Long-term collaboration geared towards institutional development
- Financing and facilitating cooperation (Partnership)
- Match between the priorities of the partner university and the interest and expertise offered by Flemish counterparts
- Coherent set of interventions/synergetic projects guided by the strategic plan of the partner university
- Building capacity:
 - Academic (MSc/PhD education; research, publishing...)
 - Internal service delivery (ICT, Library)
 - External service delivery (services to society)
 - Managerial capacity (planning, HRD, international relations etc.)

The IUC programme is focused on the institutional needs and priorities of partner universities in the South. The programme is as such demand-oriented, and seeks to promote local ownership through the full

involvement of the partner both in the design and implementation of the programme.

Support is directed towards the institutional development of the partner university, the improvement of quality of local undergraduate and postgraduate education, and the encouragement of south-south academic and research linkages. The identification of the fields of cooperation is in principle demand-based, but demands can obviously only be met to the extent that Flemish expertise is available. Each partnership consists of a coherent set of interventions/ projects geared towards the development of the teaching and research capacity of the university, as well as its institutional management.

The annual budget per partner university is € 745.000. As part of the phase-out process, the fixed annual budget decreases to 85%, 75% and 50% of a full budget for the activity programmes of year 8, 9 and 10 respectively.

At present, VLIR-UOS has 19 IUC partner programmes in Africa, Latin America and Asia. Three programmes have come to an end. Six partners are currently phasing out, of which two are to be evaluated at this point. The first IUC programmes were launched in 1997, since then the programme and management structure has evolved considerably and intake and phase out strategies were included.

As such the IUC Programme Cycle comprises three stages:

- Phase In (approximately two years);
- Partner Programme (ten years: two time blocks of five years each (Phase I and II). For each time block of five years a partner programme is to be drafted. Objectives have to be defined within a timeframe of five years);
- Post IUC Partner Programme Support (five years including a Phase out (two years) and a Post IUC Support (three years of optional participation in IUC competitive funds).

Several evaluations are foreseen in the IUC Cycle, being at Programming Stage (Preliminary Evaluation Report), midterm evaluation (after four, five years into the Phase I partner programme) and a final evaluation of the partner programme (during the Phase Out Stage). The end evaluation has been conducted in seven partner programmes and will take place in another two among which the present evaluation.

The IUC management system is based on the following division of tasks:

- **VLIR** is responsible for the programming - including the selection of partner universities -, monitoring and evaluation of the overall programme. VLIR is accountable to the Belgian government;
- the implementation of a partner programme is delegated to a **Flemish university** which functions as the coordinating university in Flanders. The Flemish university of the VLIR appointed Flemish coordinator functions as the coordinating university in Flanders. Administratively, the university of the Flemish coordinator is responsible for the day-to-day management of the programme implementation based on an agreement signed by the Flemish coordinating university and the VLIR;
- the **university of the Flemish coordinator and the partner university** have the responsibility to jointly manage the implementation of the partner programme and the constituent activity programmes based on an agreement signed by the Flemish coordinating university, the partner university and the VLIR;
- the **partner university** also has to nominate a local coordinator who functions as the key responsible person from local side;
- at the level of the **partner university** a full time professional manager is appointed in order to support the local coordinator, being an academic charged with numerous other responsibilities, in the various management duties associated with the implementation of a complex programme;
- both in the North and the South a **steering committee** is established to coordinate the implementation of a partner programme. On an annual or bi-annual basis both committees hold a **Joint Steering Committee Meeting (JSCM)**.

3. Final evaluation ESPOL/VLIR-UOS

3.1 Terms of reference for the external evaluation

Our outside evaluation has been guided by Terms of Reference (ToR) elaborated by VLIR (May 2009). The ToR entailed the external evaluation of two IUCs, with Escuela Superior Politécnica Del Litoral (ESPOL), Ecuador and with Saint Louis University (SLU) and Benguet State University (BSU) network, the Philippines. The ToR are briefly mentioned hereunder.

3.2 Objective and scope of the evaluation

Objectives

This final evaluation of the IUC cooperation programme with Escuela Superior Politécnica del Litoral (ESPOL), which came to an end in March 2009, is meant to generate conclusions that will allow:

- the identification of strengths and weaknesses of each specific IUC collaboration with the partnership institutions in particular, and of the IUC programme in general;
- VLIR-UOS to identify departments and/or research groups that have received substantial support from the IUC programme in Phase II and thus can present proposals for the 'IUC Research Initiative Programme'
- the formulation of recommendations to all stakeholders in terms of the follow up plan that has been elaborated by the Northern and Southern project leaders
- to identify and comment upon possible venues for the future of the involved projects in view of establishing sustainability

Scope

- a. the present implementation of the programme
 - evaluating the **global status of implementation** of the programme, both at the level of the overall programme and the constituent projects;
 - evaluating whether the activities, per project, have met the **objectives**, that had been defined by the actors involved, within the given timeframe and with the given means;
 - evaluating the **management** of the programme, both in Flanders and locally, and formulating, if necessary, recommendations that could be of interest for the partnerships that are still ongoing;
- b. the nature of the programme
 - evaluating the **quality, efficiency, efficacy, impact, development relevance** and **sustainability** of the programme in the light of the overall goal of the IUC Programme, being institutional capacity-building of the local university, as situated in the context of the needs of the local society;
 - evaluating the **cooperation** between all parties involved, and formulating, if necessary, recommendations that could be of interest for the partnerships that are still ongoing;
- c. the position of the IUC programme within the international cooperation activities of the partner university
 - evaluating the **added value of the IUC Programme** for the partner university, in comparison to other ongoing donor cooperation programmes;
- d. the follow up plan of the programme
 - evaluating the follow up plan as elaborated in the self assessment report, in view of the

continuation of the different activities that were launched within the framework of the IUC programme (Phase I) and the consolidation of the results as aimed for in Phase 2.

3.3 Evaluation criteria

The logical framework has served as the basic reference document in terms of the objectives and indicators specified to assess actual progress against the objectives and results formulated.

Our evaluation of the projects funded by VLIR-IUC is based on the following criteria:

Criterion	Indicators
1. Quality	<p>This is the main criterion, being the result of all other criteria.</p> <p><u>Possible indicators of 'quality' :</u></p> <ul style="list-style-type: none"> ☒ quality of research : the extent to which the results have been incorporated in local or international refereed journals ☒ quality of education : the extent to which alumni easily get a job which fits their education profile; the number of fellowships acquired from foundations ☒ quality of rendering services to society : the extent to which the university/faculty/department is involved in feasibility studies/consultancies ☒ job opportunities ☒ strategic vision
2. Effectiveness	the extent to which the specific objectives have been achieved (the level of the results)
3. Efficiency	<p>The relationship between the objectives and the means used to reach the objectives.</p> <p>The degree to which the installed capacity (human/physical/financial) is used; goals/means ratio in human, physical and financial resources</p> <p><u>Possible indicators of 'efficiency' :</u></p> <p>At the level of the programme : the extent of flexibility in the programme implementation, e.g. reallocation of resources during implementation</p>
4. Impact	<p>Not just actual but also (given time limitations) potential impact (at level of goals), looking at consultancy, policy advise and accreditation models</p> <p><u>Possible indicators of 'impact' :</u></p> <ul style="list-style-type: none"> ☒ impact at the level of the private sector : the amount of money earned on the market ☒ impact at policy level : the extent to which academics, involved in the IUC programme, are called upon by the government for policy advice ☒ impact at the level of the own university or other universities : <ul style="list-style-type: none"> - renewed curriculum functions as example for other universities/departments - the new style of teaching has become a model for teaching (e.g. the systematic use of teaching in combination with laboratory work)
5. Development relevance	the extent to which the programme/project addresses immediate and significant problems of the community, looking at the amount of self-finance, demand from state and private actors

6. Sustainability	<p>Especially financial and institutional sustainability</p> <p><u>Possible indicators of institutional commitment in the South :</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> co-funding by the partner university (matching funds) <input type="checkbox"/> incorporation of costs into the budget of the partner university <input type="checkbox"/> capacity to attract new funds <input type="checkbox"/> retention of highly qualified staff <input type="checkbox"/> the partner university sets aside funds for operations and maintenance of physical infrastructure <p><u>Possible indicators of mutual interest :</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> do the Flemish universities commit their own university funds to the programme, for instance by giving fellowships or by allowing academics to go to the field? <input type="checkbox"/> are Flemish academics personally committed (e.g. spend their holidays working in the partner university)? <input type="checkbox"/> are there joint research projects which are interesting both to the Northern and Southern academics involved? <input type="checkbox"/> do the partner universities also commit their own funds to the programme (matching funds)? <input type="checkbox"/> is there a good quality follow up plan for implementation after the 10 year period of partnership with earmarked funding? (see self assessment reports)
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3.4 Evaluation methodology

The evaluation team consisted of two persons: Dr Wietse de Vries and Drs Jolie Franke (team leader). The team used three methods to gather information:

1. Analysis of documentation on the programme, provided by VLIR and ESPOL, such as the Partner Programme proposal 2003-2008, self-assessment reports prepared by the projects, previous evaluations report and other documents (see annex 2).
2. Interviews with VLIR-UOS staff members, government officials in Ecuador and Belgium, the Belgian Embassy in Quito, the project teams at ESPOL, the ESPOL management, and with the Flemish project leaders.
3. Visits to the project sites and to external beneficiaries/participants of programme activities.

Drs Franke interviewed all Flemish project coordinators in Brussels on 8 and 9 December 2009. Also the responsible officers at the Ministry of Foreign Affairs and VLIR-UOS were interviewed.

The evaluation mission carried out from 13 till 21 January 2010, considered interviews with government officials in Quito (Ministry of Agriculture, Ministry of Industries, National Secretary for Higher Education, National Council for Evaluation and Accreditation), Belgian Embassy in Quito, and meetings with central actors at the institutional and programme level at ESPOL in Guayaquil. Interviews were also carried out with several outside stakeholders (local producers).

Preliminary observations by the evaluation team were presented at a final meeting where both Belgian and Ecuadorian stakeholders were present. Besides testing our preliminary findings with the opinions of different stakeholders, this meeting provided a moment for additional discussions.

We like to point out that all participants in the collaboration received us with complete openness and strictly on time. Furthermore, ESPOL provided us with all the logistics for transport and work. This was crucial for our visit, as it comprised interviewing some 50 people within eight days (see annex 1).

3.5 Evaluation limitations

The site visit of the evaluation, i.e. the visit to ESPOL, took place in six days, including a weekend. This obviously is a relatively short period of time to evaluate a 10-years cooperation programme with multiple components and stakeholders and study all documentation in detail.

The last days of the evaluation coincided with the annual research seminar *ESPOLCiencia*. This meant a double burden for the Ecuadorian partners, as they were occupied with the organisation of the seminar and at the same time had to attend to the external evaluation. An extensive Flemish university delegation during the same time frame as the external evaluation put the local project team even more under pressure. Although it was interesting for the evaluators to observe the interaction between the Flemish and Ecuadorian project coordinators and also to have actual information on the future cooperation plans between both parties, the programme that was organised for the delegation was very time-consuming and put the evaluators' agenda even more under pressure.

It was not possible to receive all relevant documentation on time. No precise information could be retrieved on the external cooperation programmes managed by ESPOL and their financial implications. Information found on the ESPOL website changed several times during the last few months. The VLIR-UOS bureau gave access to the IUC on-line database, which contains all project log-frames, but only at the very last moment when the evaluation report was almost due.

Financial information was received from VLIR but only at programme level. The self assessment forms by each project contained financial information on budget lines, but this information was not complete.

3.5 Reactions to the first draft evaluation report

We received various comments on our first draft of the evaluation report. Much of it was very useful and has allowed us to correct mistakes or to make better balanced judgements. In some cases, however, the opinions we received were different than the ones we heard during our visit and in other cases the various comments contradicted each other. In some cases we adjusted our views and in others we have stuck to our original impressions. But we would like to point out that these impressions are based on sometimes different opinions from several actors, from which we have tried to derive a balance. Without doubt, this implies a limited view of what has happened during a ten year period of collaboration.

Many comments concerned the scores given on the VLIR Key Result Areas (KRAs) and on the VLIR Qualitative Evaluation Criteria. In general the scores were considered too low. In the first place it was commented that in our appreciation we should take into account various external factors which impacted upon a certain situation (e.g. the fact that three projects started only in the second phase and obviously had had less time for implementation and consolidation than the first five projects).

Another central theme in the comments we received on the first draft was that our judgement was too tough and in contradiction with our positive assessment of the cooperation. Here we like to point out that we fully agree with the Belgian and Ecuadorian participants that much has been reached over the last ten years. Compared to 1999, the situation at ESPOL has changed importantly, and, as we indicate in this report, much is due to the collaboration with the VLIR. We also agree with the point of view of several actors that the problems or shortcomings of the projects may be solved in the future, as the ESPOL has been able to solve similar challenges in the past ten years. However, when asked whether objectives have been achieved, we have to consider the present situation and not assume what may be achieved in the coming months and years. Nor can we soften our judgement taking into account external factors. As such, our judgements are based on comparing, in the most objective way possible, the goals and objectives stated in the log-frames (see annex 3) with the situation we found during our visit.

We hope in this way to clear up what some commentators pointed out as an apparent contradiction: on the one hand, we state that the VLIR-ESPOL collaboration has been highly successful; on the other hand we do not assign the highest possible qualifications. This, in our view, is not a contradiction; we fully recognise that the collaboration has been very successful, but we also consider that not all objectives have been reached,

nor are all results certain to be maintained in the future. As such, our qualifications and recommendations are intended to incite ESPOL and VLIR to keep improving. A final, more technical comment on this issue: it seems that the significance of the scores is not well understood: for example in some comments a score of 3 (sufficient) is called 'mediocre' and in another case when 'almost all objectives have been achieved' a score of 5 is expected. We suggest all readers of this report take good notice of the explanation of the scores in chapter 5.

We also received criticisms on some of the indicators in the VLIR Terms of Reference, which obviously we cannot attend to as they concern VLIR formulations and not our views.

Finally we received many comments on recommendations that coincide with ESPOL views or even policies as if our recommendation would mean that ESPOL could not have the same view or could not be aware of this specific fact. We found that ESPOL has many good plans for the future. However, having plans is not enough and as long as these plans have not been implemented, we must, again, consider the actual situation. Of course, the fact that ESPOL has good policies and concrete plans for the future is considered very positive and contributes to our positive view on ESPOL and on the past cooperation.

4. National and institutional context

4.1 Ecuadorian Higher Education

Ecuadorian higher education comprises around 70 recognized higher education institutions. These are divided between Universities and Polytechnic Schools. Both award undergraduate degrees (licenciatura or engineering), comparable to the Bachelors' degree, and postgraduate diplomas (masters, doctorate). Additionally, there exists a sector of some 300 technical institutes that award technical or associate degrees.

Of the total of Higher Education Institutions (HEI), 28 are public (fully funded by the national government), 9 are co-financed (formally private, but with some public support) and over 30 are fully private (without public support).

Student numbers have risen rapidly over the last two decades: in 1988, the public institutions attend some 128 thousand students, the co-financed ones 40 thousand and the fully private sector was inexistent. By 2003, the public sector catered to 191 thousand students, the co-financed sector to 93 thousand, and the private sector to 51 thousand. Over the last ten years, the number of private HEI has rapidly expanded.

The system has followed the 'traditional' Latin-American way of development. The first universities were set up following the Spanish (or Napoleonic) model of Faculties, dedicated mainly to programmes such as Law, Medicine, Civil Engineering or Administration. As access expanded in the 1970s and 1980s, these universities grew rapidly and at this moment enrol over 40 thousand students.

In the Ecuadorian situation, however, some exceptions occurred: starting in the 1950s, consecutive national governments decided that alternatives were needed and opted to create Polytechnic Schools, with a clear aim to gear higher education more towards the crucial sectors of the national economy (oil, bananas, fishing, etc.). This has lead, among others, to the creation of ESPOL.

The Ecuadorian system of higher education is fairly unique in the sense that there does not exist a direct regulation by the national or provincial authorities. The Ministry of Education and Culture mainly attends primary and secondary education, and has little direct involvement in Higher Education. The system is regulated by the *Consejo Nacional de Educación Superior* (CONESUP), a body of nine persons representing different sectors: two rectors from the public universities, one from the public Polytechnic schools, one from the private institutions, one from the technical institutes, the Minister of Education and Culture, the Secretary for Science and Technology, a representative of the private sector, and its president.

Although this might seem to be a rather small and informal club, the CONESUP plays a crucial role: since 2000, all new institutions or programmes have to be approved by parliament, which will only do so after endorsement by the CONESUP (the creation of HEI prior to 2000 was not regulated. Between 1970 and 2000, some 30 universities were created by 'political patronage', creating questions about quality). In order to approve a new programme of institutions, CONESUP revises the number of credits for each programme, as well as the academic and financial viability of each proposal.

In addition to the CONESUP, there is the *Consejo Nacional de Evaluación y Acreditación* (CONEA), which carries out institutional evaluations since 2005. CONEA is formally independent from the CONESUP or other authorities, but operates in close coordination with CONESUP. Accreditation is mandatory (according to article 79 of the Constitution, which mandates that all HEI should be held accountable), and is playing an increasingly important role through the market: CONEA publishes a list of accredited institutions, as well as a type of ranking, pointing out the best and worst HEI in four groups (ESPOL comes out as one of the best).

Funding, in turn, is carried out through SENPLADES, the National Secretary for Planning and Development, and is based on enrolments and projects presented. Additionally, various Ministries (such as the one for Agriculture) tend to channel funds to universities for specific projects. As such, the Secretary of Education has little to no influence on the development of higher education, leaving institutions much leeway to decide their own development and to look for additional funding.

However, within the Higher Education system, high disparities persist. Although many private universities have been created (18 since 2000), most students go to the public universities. By 2006, total enrolments

were 313 thousand, of which 217 thousand in public universities and polytechnic schools, 83 thousand in private co-financed institutions and 60 thousand in private HEI.

Over 95% of students are undergraduate and only about 5% study postgraduate programs. Postgraduate programmes are mainly limited to masters programs in administration and the social sciences. PhD programmes are nearly inexistent, which makes it difficult to find researchers with a PhD title in Ecuador (total enrolments at the postgraduate level were around 7 thousand by 2004, mostly Masters).

These disparities have several reasons. A historical one is that the first Ecuadorian HEI, in the 19th century, were modelled after the Spanish (or French) model of *licenciaturas* (licenses), that is, long term specialized programmes that allow graduates to practice a profession. Postgraduate studies were only recently superimposed on this model. A practical reason is the inefficiency of undergraduate education: most undergraduate programs take over seven years to finish and less than 25% of students manage to finish at all. This clearly reduces the pool of possible postgraduate students, and means that a student who opts for a PhD will be studying well into his thirties.

Moreover, most students are concentrated in Administration and Commerce (30%), followed by Health (21%), Social Sciences (including Law, 16%) and Education (15%). Agriculture represents 5%, basic sciences 3% and technologies 9%. Even within the sector of Superior Technological Schools, over 40% of students are enrolled in Administration and Commerce.

A similar situation reflects itself among the academic staff. Most academics only have an undergraduate title, and work part-time, dedicated exclusively to teaching. Within the rules stipulated in the new Law of Education, universities should only hire, and offer tenure to, professors with a MSc in full time posts. Some universities, such as ESPOL, have made a PhD degree mandatory for these positions. For these reasons, most staff work on a part-time basis, at low salaries, without tenure. Staff dedicated full time to research is rare.

In the light of these numbers it should be hardly surprising that scientific research is poorly developed. Public and private universities are mostly dedicated to undergraduate teaching and little human capital exists to carry out research. Teaching future professionals at the undergraduate level has traditionally been their primary task, and universities were not set up around strong groups of full time researchers, with clear hierarchical lines and a strong position for the professoriate.

Additionally, relationships between the universities and private enterprise have never been very strong, with both sides looking at each other with certain distrust. In turn, the relationship between the national government and the universities has been shifting, depending on the parties in power and the economic situation.

Even so, the public universities concentrate most of the research going on in Ecuador. Research institutes in the private sector are scarce as is research in the public sector. Funding for research is coordinated, since 1993 when CONACYT disappeared for being inefficient and was succeeded by SENACYT (*Secretaría Nacional de Ciencia y Tecnología*) and FUNDACYT, the first designing policies, the second managing funds. The first level involves the vice-presidency, SENACYT and the Advising Council for S&T, the second is a formally private entity (FUNDACYT) which allows for the combination of public and private funding for research. (e.g. Congress stipulated in 2005 that 5% of oil revenues should be invested in Science and Technology (S&T), CEREP funding). Even so, funding for S&T is low, representing about 0.09% of GNP (compared to 0.62% in Latin America).

According to data from FUNDACYT, by 2003 there were some 845 researchers working on S&T, but only some 10% were doing full-time research, while 43% dedicated less than half of their time to research. Only 10% held a PhD, 25% MSc and 65% were undergraduates. (*Revista CONESUP El estado de la educación superior en el Ecuador 2004-2005, N° 2, año 2005, CONESUP: Quito*)

The situation has improved during the last few years, as more action is taken to regulate higher education (with the new law currently in debate and a national accreditation agency operating) and an increase of funding for research. Funding for Research and Development rose from 0.06% of GNP in 2005 to 0.23% in 2007 (*Secretaría Nacional de Ciencia y Tecnología, Indicadores de Actividades Científicas y Tecnológicas*

Ecuador 2009). Government officials we interviewed stressed the importance of research, especially in crucial sectors of the economy, but the government budget is very limited and dependent on oil prices. Furthermore, there is an increasing demand for undergraduate studies from formerly excluded social sectors, and the Constitution of 2008 states that education in all public institutions should be free of charge (no tuition). This will place further pressure on universities to expand infrastructure, and on teachers to teach at the undergraduate programmes, but it leaves the public institutions completely dependent on government or outside funding.

On the positive side, it should be noted that several universities have opted to find outside assistance in order to cope with national limitations. Some universities, particularly ESPOL, have been highly successful in obtaining long term assistance from national and international agencies.

4.2 Escuela Superior Politécnica del Litoral

The Escuela Superior Politécnica del Litoral (ESPOL), located in the city of Guayaquil, is one of the most highly regarded universities in Ecuador. ESPOL was founded in 1958, on the basis of government considerations that higher education in Ecuador needed a new sector of institutions, more geared towards the needs of industry and agriculture (in the 1950s, the coastal provinces, particularly Guayaquil, became the main area of production and exportation, with oil, bananas, cacao, fishing). As such, ESPOL started with a different mandate: most programmes are in the engineering sector, and ESPOL does not offer the traditional programmes such as Medicine or Law. The first generation of 51 students started in 1959 in a campus located in the centre of Guayaquil, with 15 professors and five supporting staff.

According to the current rector, ESPOL has undergone different phases of development. In the first one, several new engineering programmes were created (Oil and Mining, Electricity, Mechanics, Naval Engineering), which lead to an initial problem of where to find competent staff. Over the years, new programmes were added and new staff was hired. Several ESPOL graduates obtained MSc degrees through scholarships abroad (Harvard-LASPAU) and of these between 35 and 40 were contracted by ESPOL.

This expansion led to the need for more infrastructure and new campuses were created. The current main campus (Gustavo Galindo) was built in the 1980s on the outskirts of Guayaquil, with a loan from the International Development Bank (the last loan for higher education in Latin America). It has a modern infrastructure and plenty of room (724 hectares). Other campuses include Las Peñas (the original campus), CENAIM (located in a coastal town, San Pedro de Manglaralto), Santa Elena, and Daule.

Currently, ESPOL is creating new buildings at the Gustavo Galindo campus to house the Knowledge Park (PARCONESPOL). It will house several research and service centres.

ESPOL currently has five faculties and 15 research centres, which offer 22 engineering courses (*ingenierías*), 14 technology courses (*tecnologías*), 14 licenciate courses (*licenciaturas*), and 26 master courses (*maestrías*) (ESPOL website information). The research centres tend to depend directly on the rector, and not on the Faculties. Student population has grown fast during the last 50 years: currently some 12 thousand students are enrolled of which over 8000 at pregraduate level, 500 postgraduate, over 3000 in preparation courses and some 250 in technology courses¹. Staff figures indicate 483 academic staff (50% on permanent basis (*nóminamiento*) and 50% working on temporary contracts) and 473 administrative staff (*Estadísticas ESPOL 2008/2009*).

Although the university's legal structure orients towards education, research and social interaction, in practice all Ecuadorian universities are in the first place oriented towards undergraduate education. The development of research as part of ESPOL's activities is directly linked to international cooperation, in particular with VLIR.

As to funding, ESPOL stands apart from most other public institutions, as it is not totally dependent on government funding. In 2008, 37% of revenue came from direct public funding, 12% from income tax and

¹ No exact figures can be given, as the information obtained from varying sources was not always consistent.

51% from self generated funds such as national and international cooperation, service delivery and oil exploitation (*Informe de labores 2008*). However, recent changes in the Higher Education system influence the funding system, as there are no more contributions out of income tax revenues and students do no longer have to pay fees for undergraduate education. On the other hand, it is expected that ESPOL will profit from funds that will be made available to promote excellence at Ecuadorian universities. In the future more chances are to come, as the concession to exploit oil in the Peninsula Santa Elena, which was conceded to ESPOL in 1996, will end in 2015.

Rector Dr Moisés Tacle was elected in 2003 and re-elected in 2008. He presented ESPOL's strategic plan 2008-2012 which contains 62 objectives in various fields. Among the overall institutional policies figures the goal to achieve a ranking among the first 40 institutions of Latin America; the promotion of technological development and entrepreneurial culture and the goal to support research in an integral way. The mission of ESPOL as elaborated in the strategic plan is: To train excellent professionals, leaders, entrepreneurs, with strong moral and ethical values that contribute to national development, improving the country socially, economically, environmentally and politically and to do quality research, technology transfer and extension in order to serve society (*Plan estratégico 2008-2012*).

Complying with the objective formulated in the Strategic Plan to become a Research University, ESPOL approved in September 2009 its 'Research priorities 2010-2020' which is an ambitious plan with action points in six research fields: Agriculture and Animal Production; Education and Communication; Climate and Environment; Alternative and Renewable Energy; Environmental Management and Industrial Technology. These research priorities have been selected with a view on their potential relevance for society: 'ESPOL must take advantage of knowledge to influence society, making sure that research makes a difference in the development of a just, balanced and sustainable development' (*Prioridades de investigación de la ESPOL 2010-2020*).

4.3 VLIR-IUC programme at ESPOL

The VLIR-UOS IUC programme at ESPOL started in 1999, building upon earlier cooperation between ESPOL and Free University Brussels, Ghent University and Leuven University under the framework of the Own Initiatives Programme (OI). The preparation of the IUC programme was based on priorities identified by ESPOL and on a first mission to Belgium in 1998 by an ESPOL delegation. The ESPOL delegation was clear on what they wanted and even had concrete wishes concerning the Belgian expertise. Ghent University was very responsive to these demands.

The first phase of collaboration consisted of six components. After an external evaluation in 2002, the second phase was prepared, taking into account the recommendations of the evaluation. In general the external evaluation was quite positive, with some specific recommendations to the components, such as to increment cooperation and exchange, to work towards sustainability and to increment impact at policy making, private sector and other universities.

After a first phase of research capacity building, infrastructural development and staff training, the second phase aimed at consolidating the results of the first phase and enhancing the quality of the centres and at the same time broadening the cooperation in order to enhance institutional embedding. Several new components entered in the second phase while one component was not continued. The selection of the three new components in the second phase was based on an open call within ESPOL to which 48 proposals were received and evaluated by the joint steering committee. Some project ideas were integrated and three new components were added to the cooperation programme, leading to a total of eight components (refer to annex 3 for the projects and their objectives):

P1: Enhancement of Research Capabilities

P2: Education innovation in Engineering through Information Technology

P3: Biotechnology for a sustainable, environmental and social development of Ecuadorian agriculture

P4: Environmental management systems in agriculture and aquaculture

P5: Management techniques for sustainable aquaculture

P6: Research applications of non-metallic materials

P7: Entrepreneurship development programme

P8: Education and Research Capabilities Development Programme for software engineering, telecommunications and robotics

5. Qualitative evaluation of the programme and its constituent projects in terms of quality, efficiency, effectiveness, impact, development relevance and sustainability

In this chapter the achievements of the projects will be assessed, including their scores against qualitative indicators. The scores for the projects are summarized in the table below. The projects are the following:

P1: Enhancement of Research Capabilities

P2: Education innovation in Engineering through Information Technology

P3: Biotechnology for a sustainable, environmental and social development of Ecuadorian agriculture

P4: Environmental management systems in agriculture and aquaculture

P5: Management techniques for sustainable aquaculture

P6: Research applications of non-metallic materials

P7: Entrepreneurship development programme

P8: Education and Research Capabilities Development Programme for software engineering, telecommunications and robotics

Projects are evaluated on a five point scale, with the following qualifications:

1= (very) poor

2= insufficient/low

3= sufficient

4= good/high

5= excellent/very high

Table 1: Component scores on qualitative evaluation criteria.

Qualitative evaluation criteria	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	t	t/8
1. Quality	4	5	4	4	2	4	3	3	29	3.6
2. Effectiveness	4	4	3	3	2	4	3	3	26	3.25
3. Efficiency	4	4	3	3	3	3	3	3	26	3.25
4. Impact	4	5	4	4	4	3	3	3	30	3.75
5. Development relevance	4	4	4	4	4	4	4	4	32	4
6. Sustainability	3	4	3	4	3	4	3	3	27	3.4
Total	23	26	21	22	18	22	19	19	170	21.25

The specific qualifications for each project will be explained in the following pages. In chapter 6 the programme as a whole will be evaluated, taking into account the VLIR evaluation criteria.

Project 1. Enhancement of Research Capabilities

When the collaboration between the VLIR and ESPOL started, ESPOL had nearly no research activities (with the exception of CENAIME) but a long term mission to become a research university. This objective was clearly reflected when phase I of VLIR-ESPOL program started in 1999.

A first step to reach this goal was the participation of the Centro Institucional de Ciencia y Tecnología (CICYT), which existed since 1983 as a coordinating body to organize research at ESPOL. As such, CICYT is not really a research centre, but rather an academic-administrative entity with the mission to develop policies and strategies to foster research within ESPOL and to be a coordinating agency between ESPOL and outside funding agencies. It has been the linchpin for the collaboration between the ESPOL and the VLIR.

The main challenges the CICYT has faced ever since have been several: first of all, there was no research culture at the institutional or national level. At the country level, there has been traditionally a scarce support for research, and little support for potential PhD candidates. The National Secretary for Research and Technology has little power at the national political level and suffers from continuous changes at high management level. The response at ESPOL has been to develop a strategy based mainly on international cooperation, for which the VLIR has been a crucial starting point.

The intermediary evaluation of the VLIR- ESPOL collaboration of 2002 points out that ESPOL still was strongly oriented towards (undergraduate) teaching. By 2010, this remains the main activity. However, by now the CICYT plays a very active role as a promoter of scientific research. It does so by assisting professors to find funding, write papers and publish. It also plays an important role in bringing people from different areas together around projects, by planning research projects, regulating consultancies and collaboration with outside parties, and by finding funds.

Thus, the CICYT should not be seen merely as a research centre, whose performance could be measured by publications, patents or impact on society. Rather, it has been an entity that has been dedicated to bring researchers together, set up new projects and find external donors.

The CICYT played a central role in the collaboration with VLIR. It was the first contact, it administrated all funds over the ten year period (the budget information can be accessed on-line by all participants), and it organized the process of competitive funding in phase two.

In hindsight, the creation of CICYT at the start of the VLIR-ESPOL collaboration has had several benefits:

- There was a clear coordinating agency from the start that invited several potential researchers to submit proposals. Coordination with Belgian counterparts was fluid from the start;
- CICYT invited individual researchers to form teams, often with participants from several Faculties;
- Collaboration between VLIR and ESPOL did not depend on one contact person, but on a capable staff;
- Follow up of projects has been permanent, through monthly meetings;
- New projects were developed, and rapid adjustments were made to existing ones;
- Several projects received additional funds (both institutional and outside) to guarantee their progress and future sustainability;
- ESPOL has a clear ownership of all projects, and all projects seem sustainable in the future.

Among the objectives for the CICYT for phase 2 were:

- To consolidate the Interactive Science Centre to stimulate scientific thinking among young people.
- To establish proper mechanisms to encourage multidisciplinary research activities.
- To increase the number of research proposals submitted to national and international founding institutions.
- To establish at ESPOL mechanisms to recognize faculty research activities.

It is difficult to separate the effects of this project from the whole programme, as the CICYT has been operating both as a research centre and as a coordinating agency for several projects in other centers. In general terms, these goals have been reached: CICYT is now the central agency at ESPOL to support scientific research, and has been able to organize teams and find inside and outside funding. Currently, ESPOL is the university that submits (and gets approved) the most research proposals. It is also the one with most registered publications. Additionally, the journal "*Tecnológica*" has been indexed in Latinindex, and ESPOLCIENCIA is a regular and much visited scientific event.

Assessment of KRAs Project 1

Key result areas	Indicators (quantitative and full descriptive data) / Comments	Score
KRA 1: Research	The CICYT has supported a large number of publications over the last ten years. However, most are still in Spanish and are	4

	published in very local journals. Publications in English in important international journal remain a problem, even after offering workshops and translation services. Even so, research has gained a prominent position within ESPOL, with clear legal and financial support. Through CICYT, there has also been an increasing access to inside and outside funding	
KRA 2. Teaching	CICYT is not involved in teaching, but according to ESPOL regulations, all researchers have to teach at least one course per semester (10 hours per week). This way, all researchers remain actively involved in undergraduate teaching. A point that merits attention is the development of human resources through masters and PhD programmes at ESPOL itself. ESPOL needs to develop masters and PhD programmes in order to guarantee its future development.	4
KRA 3: Extension and outreach	All VLIR projects coordinated through CICYT have a strong outreach part.	4
KRA 4: Management	Management of VLIR resources has been excellent, and has been accompanied by other resources.	5
KRA 5: Human resources development	In general, ESPOL has complied with the planned schedule for postgraduate studies abroad. Although some candidates dropped out early and some left ESPOL after having obtained their degree, we think this is not exceptional, and neither is the fact that almost all candidates had to extend their study period. At the time of the evaluation still seven candidates were studying.	4
KRA 6: Infrastructure Management	Infrastructure has developed much with VLIR. Some laboratories still lack ISO certification in order to provide services. The crucial issue at this point is the construction of PARCON.	4
KRA 7: Mobilisation of additional resources/opportunities	It stands out that almost all projects have found additional funding. It should also be stressed that the institution has assumed a strong compromise to co-fund all projects.	5

Qualitative evaluation Project 1

Qualitative evaluation criteria	Indicators / Comments	Score
1. Quality	CICYT has been able to create a research culture where none existed. By now, many projects count with outside funding and are very relevant for local development. For example, ESPOL submitted in 2005, 14 projects to CONESUP and 7 to FUNDACYT. In 2006, it submitted 120 to CEREPS and in 2007, 90 to CEREPS. Currently, ESPOL is the Ecuadorian university that submits (and obtains) most funding proposals to the national government. However, we noticed that writing, and especially writing in English for international peer reviewed journals remains a difficult part. CICYT must continue its efforts in this field.	4

2. Effectiveness	<p>Between 2004 and 2008, 89 seed projects were funded with CICYT own resources, plus the outside funding mentioned above. Procedures for elaborating and submitting projects were validated as part of external audit of the quality certification (January 2008). By 2009:</p> <ul style="list-style-type: none"> • ESPOL was the Ecuadorian university that submitted the largest number of projects to local founding agencies. • ESPOL is the Ecuadorian University with the largest number of projects supported by CONESUP, SENACYT and FUNDACYT. • ESPOL is the Ecuadorian University with more national and international publications. According to SENACYT data, ESPOL doubles in number of publication to the second best one. • ESPOLciencia has been established as a regular scientific event in ESPOL. • “Tecnológica” (ESPOL journal) has been indexed in Latindex. • Strategies to establish a research culture at ESPOL were implemented. One example is the Research Council. ESPOL Rector leads this Council. 	4
3. Efficiency	<p>Management of funding has been very transparent and on-line. CICYT has shown a great management and organizational capacity. However the relation between CICYT and the Research Council is not very logical. The original organisation had its logic: research was a marginal activity and could be organised by a small number of stakeholders. Ten years later, however, research is a central activity within ESPOL and involves various outside stakeholders. Participation in the Research Council should be broadened, and its relation with CICYT formalised.</p>	4
4. Impact	<p>The collaboration with the VLIR has had an important impact in two aspects: 1. The establishment of a research culture within ESPOL, through the creation of several research projects and centres; 2. the establishment of ties between research centres and third parties (local producers, social groups, other educational institutions). The collaboration between ESPOL and the University of Cuenca is an outstanding example.</p> <p>All projects have a direct impact in the region or even at national level (bananas, shrimps, water, access to internet, etc.). See also projects 2 to 8 and 6.4.</p>	4
5. Development relevance	<p>The projects stand out for their direct impact in crucial areas. All projects have attended directly important regional or national matters, such as diseases of main export products (shrimp, bananas) or questions of national development in Science and Technology (Laboratories with ISO certification, decision making models in environmental issues, access to Internet2, etc.).</p>	4
6. Sustainability	<p>CICYT has its place and function within ESPOL and will be able to maintain itself in the future. Effectively, the custom of monthly meetings of project coordinators is maintained on an</p>	3

	<p>informal basis and very much appreciated by all involved. On the other hand, after termination of the IUC cooperation, CICYT staff was halved from 14 to 7 staff members. For the future it is important that the organisation of research within ESPOL is optimised and the relation between the Research Council and CICYT be clarified. This would imply the creation of a new institutional structure that would be responsible for coordinating and promoting research and postgraduate studies, in order to convert ESPOL in a Research University</p>	
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Overall Assessment of Project 1:

1. CICYT has been very successful as a coordinating body for research at ESPOL. It achieved to establish a research culture at ESPOL.
2. CICYT was also efficient in managing the IUC programme.
3. In terms of future sustainability the recent measures to halve CICYT staff are worrying.
4. The relation between CICYT and the Research Council is confusing and should be better defined. In particular, the participation of researchers in the Research Council, currently a very small group, should be broadened. In our view, the aim of ESPOL to become a research university will require stronger administrative and collegial bodies.

Recommendations regarding Project 1:

1. A first recommendation for ESPOL is to establish the CICYT as a kind of Vice-Presidency for Research and optimise the relation between CICYT and the Research Council. The Research Council should be strengthened. It would seem logical to increase participation, but also to maintain and formalise the custom of monthly meetings.
2. ESPOL should strengthen staff base for CICYT.
3. CICYT should continue its efforts to strengthen research culture within ESPOL, especially regarding scientific publications in international peer reviewed journals.
4. ESPOL should strengthen postgraduate education. This was not an objective at the start of the VLIR-ESPOL collaboration. However, ten years later, it seems obvious that ESPOL can and needs to develop first masters and eventually PhD programmes in order to guarantee its future development. While it is clear that ESPOL could not offer high quality postgraduate programmes in 1999, because of a lack of qualified staff, it should also be clear that ESPOL will not become a research university if it does not offer high quality postgraduate programmes linked to the research centres.

Project 2: Education innovation in Engineering through Information Technology

The *Centro de Tecnologías de la Información* (CTI) was set up as a project at the start of the VLIR-ESPOL collaboration in 1999. In phase one, the centre sought to innovate education through a project entitled "Education Innovation and Research Enhancement – Component 2". In its first stages it sought to create a critical mass of professors and staff members within ESPOL, capable to innovate their educational practices in the classroom, through the use of information technologies. The principal aim of the project in phase 1 was to develop the research capacity, the critical mass, infrastructure and technology for distance education in ESPOL, by using new information technologies, developing course content and providing the means for facilitating the development and access to multimedia materials in and for ESPOL only.

As a collateral effect (not funded or planned in the VLIR-ESPOL collaboration), the project has also had a strong outreach component: several primary schools in the region were given access to internet and teachers were provided with on-line materials to improve their teaching. The project has been very successful in many senses: it trained over 500 teachers at ESPOL to create on-line content, but it also made computers available to poor schools through moving containers, and developed courses.

The project for primary schools continues to operate, but is now coordinated by the Ministry of Education in several other provinces in Ecuador (Manabi, El Oro). At the same time, many primary schools in the Santa Elena Province now count with permanent computer laboratories.

In the second phase the project focused on innovation of education through technology as a continuation from “Education Innovation and Research Enhancement – Component 2” from Phase I, and it was committed to develop a critical mass of professors and staff members within ESPOL, capable of innovating their educational practices in the classroom, through the use of information technologies.

The process of innovation also involved starting curriculum development in engineering, creating the means for research and development, forming Ph.D.s and other graduates, until a regular educational program can be offered in ESPOL

Additionally, it meant the development of a technological infrastructure for course content design and development using information technologies, as well as the development of the technological infrastructure within ESPOL to allow for the next generation applications for Internet, such as distance education, digital libraries, virtual laboratories, remote manipulation, 3D visualization and simulation, among others.

A central problem the project had to tackle has been connectivity. At the start of the project, Ecuadorian universities had poor connections at a high price. As a side effect of the VLIR collaboration, ESPOL started to collaborate with several other universities in order to guarantee access to Internet 2. At this moment, there is a consortium of 23 universities that have contracted the services of one provider at a very low cost.

A second challenge has been to train professors in the use of ICT and in the use of them in courses and contents. Here too progress has been made: most courses now have on-line contents, though there is not yet an offering of distance education.

The technocratic side of the project has been the least troublesome part. What stands out is that the CTI has been able to interest and educate a large pool of teachers in the use of ICT, not only within ESPOL but also outside.

Overall objectives for phase 2 were:

- The institutional capacity of ESPOL to generate relevant research based knowledge and services in strategic areas of national development, and provide innovative quality training, is enhanced. (overall academic objective)
- In Ecuador, ICT is being effectively and widely utilized to enhance learning processes and environments. (overall development objective)

The specific objective for the project was to develop ESPOL as the leading institution in Ecuador in terms of integration and use of ICT in learning processes & environments to enhance cognitive and collaborative skills, and is a national and internationally recognized Center for multimedia development and training. This was to be done by developing a critical mass in ESPOL, which can face the challenges of new digital society as well as the pedagogical aspects of this process within the classroom. This meant a continuing training program directed to professors and trainers in the use of ICT in the classroom.

In this, CTI has complied with all its goals, in an excellent collaboration with Belgian counterparts. Both counterparts met two or three times a year (current projects are now coordinated by Martin Valcke on the request of both parties). Furthermore, CTI is actively participating with the Universidad de Cuenca, in their collaboration with VLIR.

Assessment of KRAs Project 2

Key result areas	Indicators (quantitative and full descriptive data) / comments	Score
KRA 1: Research	It would not be fair to judge CTI by its research production. Though several papers were presented, it was not the aim, from the start of the collaboration, to produce a large number of research papers. Still eight international peer reviewed papers have been published which	4

	is within the VLIR-ESPOL programme a very good score.	
KRA 2. Teaching	The impact on teaching of the CTI has been enormous. On the one hand, collaborators of the CTI continue to teach at the undergraduate level. On the other, the CTI has organized numerous courses to teach teachers how to incorporate ITC in their courses. This includes primary school teachers as well as academic staff from other universities. Last, but certainly not the least is the use of ICT in ESPOL courses and the use by 6000 ESPOL students of the interactive education system developed by the project. At the end of the project more than 500 courses with multimedia components and an appropriate pedagogical model fully developed by CTI have been developed and more than 500 ESPOL professors have been trained in the use of ICT in the classroom and adequate pedagogical methodologies.	5
KRA 3: Extension and outreach	The project has had a broad impact in primary schools, on ESPOL and on some twenty other universities.	5
KRA 4: Management	The project has been well managed. It even developed an on-line system for academics and financial management that was adopted by other entities at ESPOL.	4
KRA 5: Human resources development	Two PhDs have been delivered by the IUC programme and both are integrated as permanent staff. One of them had participated in MSc studies in Belgium during the first phase. 6 other staff members were trained in Belgium, in short programmes	4
KRA 6: Infrastructure Management	The CTI has now fully operative facilities. Things promise to get even better with the move to PARCON. The CTI facilities are the first to be constructed.	4
KRA 7: Mobilisation of additional resources/opportunities	CTI is by now fully independent from VLIR support. The centre has found many outside funding sources and has become even profitable.	5

Qualitative evaluation Project 2

Qualitative evaluation criteria	Indicators / Comments	Score
1. Quality	The project has made impressive progress starting from nothing. The CTI now provides services to teachers, students and outside parties, using a variety of on-line services. It also has developed on-line contents for several levels.	5
2. Effectiveness	CTI has been very successful and actual results have been surpassed expectation sometimes with a factor 10. The specific objective of establishing ESPOL as a leading institution in Ecuador in terms of ICT for education has been achieved.	4
3. Efficiency	Funds by the VLIR have been used to the maximum. Original funding by VLIR was no doubt a crucial factor. However, the project has managed to go well beyond the original goals, not only by finding additional funding, but also by organizing third parties (primary schools, the ministry, and other universities) in networks.	4
4. Impact	This project has had its impact outside ESPOL on all levels of education, primary, secondary and university education, and the project is extending to other regions and institutions	5
5. Development relevance	ICT is a crucial factor for Ecuadorian development. Impact has been high in Santa Elena province, where now many primary schools count with computer laboratories. By now, most services within ESPOL depend on CTI.	4

6. Sustainability	The CTI has now a fully capable staff of 32 members, including 4 PhDs and 2 MScs. Turnover is high, as staff with the CTI characteristics is in high demand in the private sector. However, this is not considered as a problem, as many recently graduated seek a job at CTI. For the near future an ambitious staff development plan is elaborated envisaging to integrate eight new PhDs with their respective research groups. CTI enjoys full commitment of the ESPOL authorities and it will be the first centre to establish itself at PARCON for its crucial role.	4
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Overall Assessment of Project 2:

CTI has been a success story. The initial funding by the VLIR triggered off a large series of innovative initiatives that are by now funded or supported by third parties.

Recommendations regarding Project 2:

CTI could become even better through two ways: a master's programme to train new generations, and the development of on-line or distance education. The two could be combined: the CTI would need more experts in the near future in the area of developing on-line contents, coming from areas such as psychology, pedagogy or education. These areas currently do not exist at ESPOL.

Project 3: Biotechnology for a sustainable, environmental and social development of Ecuadorian agriculture

CIBE (*Centro de Investigaciones Biotecnológicas del Ecuador*) has largely benefited from the collaboration with VLIR. The centre was built from scratch, and is now well equipped (with ESPOL co-funding) and well embedded in ESPOL. The centre has six research groups, a general director and is directly located under the ESPOL rector. The first phase of cooperation was characterized by rapid growth and expansion, opening up the completely new field of biotechnology for post-graduate teaching and scientific research and connecting with small and medium producers. Three PhD trajectories were initiated which were to culminate in the second phase.

The specific objectives for the second phase were:

1. CIBE institutionalised in ESPOL and integrated in INIBAP Musa LAC network.
2. PhD graduates recruited as professional staff of ESPOL.
3. High yielding stress tolerant bananas and plantains available and cultivated.

Assessment of KRAs Project 3

Key result areas	Indicators (quantitative and full descriptive data) / Comments	Score
KRA 1: Research	Research in CIBE was originally focused on Black Sigatoka diseases in bananas. CIBE research activities combine fundamental and applied research and lab and field research. Towards the end of the cooperation, research has diversified and include other biological and biotechnological subjects such as cacao and vegetables. There are now six different research groups. As of 2010 staff evaluations will take into account scientific production. The results of these evaluations will affect salary scales. Six international peer reviewed publications were accepted, one is under consideration and two are still under preparation.	4

KRA 2: Teaching	CIBE forms the infrastructural and technical base for undergraduate and master degree education in biotechnology.	3
KRA 3: Extension and outreach	CIBE research results are being applied at various banana production farms. CIBE works with small and medium farmers. Research results are disseminated towards other universities and other countries (Costa Rica). A lot of on-site training of farmers and researchers takes place in the field.	4
KRA 4: Management	Project management suffered from losses and changes. The actual CIBE director is professional and straightforward.	4
KRA 5: Human resources development	The project started with a three month basic course for 42 participants. Ten most outstanding participants were selected for an advanced course. From this group, three candidates were selected for a PhD trajectory. Two PhDs graduated in Belgium and were integrated in CIBE with fixed nominations. However one was called to Quito as a state secretary for agricultural promotion at the Ministry of Agriculture (MAGAP). She remains linked to the Centre, dictates classes on Saturdays and continues supervising master student theses. However her research activities and pending publications stagnate. The third candidate is expected to finish in 2010. From the original group that participated in the basic and advanced training only two remain actually within CIBE.	2
KRA 6: Infrastructure Management	CIBE counts with four state of the art laboratories and a fully renovated building. Plans for a completely new centre within the PARCON knowledge park have been presented and are expected to be financed by the Ecuadorian Secretary of Planning (SENPLADES).	4
KRA 7: Mobilisation of additional resources/opportunities	Biotechnology is a priority topic for the Ecuadorian government as well as for ESPOL. This, combined with the quality of CIBE's research and infrastructure attracts extra funding from ESPOL, SENACYT and international donors.	4

Qualitative evaluation Project 3

Qualitative evaluation criteria	Indicators / Comments	Score
1. Quality	Although not all CIBE research groups have reached the same level, the quality of research in general is good, and responds to local and national demands. CIBE has obtained the ISO 9001:2000 certification. Fundamental research is combined with practical applications; two permanent PhDs, one underway and one on leave; 6 international publications.	4
2. Effectiveness	Not all objectives have been obtained. CIBE is firmly embedded in ESPOL, and is part of the global and regional plantain and banana research networks INIBAP and MUSALAC. Black sigatoka is fairly under control, although not overcome. But of the three planned PhDs, only one is presently working at CIBE. Although it is expected that the third candidate will defend his thesis this year and will be integrated and nominated as CIBE staff, this is not certain. Nor is it certain that the second PhD, the actual state secretary, will return to CIBE.	3
3. Efficiency	Two of the three PhD trajectories were full time in Belgium, which was considered efficient but at the same time alienated	3

	<p>the candidates from CIBE and ESPOL. The third candidate did most of her field work in Ecuador, but additional activities slowed down her pace and caused a considerable delay. However, one of the two full time candidates in Belgium is already seven years underway and has not yet graduated. CIBE management considers the VLIR/UOS programme concentrated its HRD efforts too much in three isolated PhD candidates, at the cost of building a broader capacity base, involving more team members in short capacity building activities. However, in view of the high staff turn-over it is doubtful whether such a strategy would have had more effect. The project has managed to find additional funding, by increasing interactions with ESPOL and with other components of the current programme by jointly applying and receiving additional funds from other sources (collaboration among components 3, 4 and 5). Flemish counterparts have been actively involved and are appreciated by the CIBE and ESPOL management.</p>	
4. Impact	<p>CIBE has the potential to become one of the world's outstanding research biotechnology centres on (organic) bananas. The centre is already having impact through transfer of technologies and research results to small and medium producers and researchers in Ecuador and to some extent also in some other countries.</p>	4
5. Development relevance	<p>Bananas and plantains are the world's fourth staple growth. Ecuador is the world greatest banana exporter and, in contrast with other important exporters like Costa Rica and Colombia, the Ecuadorean export sector consists mostly of small and medium enterprises. In addition while the banana export market for conventional bananas is saturated, the market for organic bananas is growing. Banana production is worldwide hampered by important diseases like black sigatoka and biotechnological research on these and related topics are considered highly relevant for Ecuador and other countries. The importance of biotechnology for Ecuador has been confirmed in the meeting with the Belgian Embassy as well as by the General Secretary for Science and Technology, Econ. René Ramírez during his visit to ESPOL in November 2009.</p>	4
6. Sustainability	<p>Although the finalization of the VLIR/UOS programme was felt in the centre through reduction of funds for operational costs, the Centre probably will survive without the assistance of VLIR, as it is involved in several projects funded by external donors. The laboratories are well equipped and externally certificated. Also the commitment of ESPOL authorities towards CIBE, and the plans for a newly built centre in the knowledge park seem promissory (refer to objectives 24 and 25 in the ESPOL strategic plan 2008-2012). However, the weak point remains the staff stability. CIBE has only two permanent staff positions and 21 staff working with loose contracts and relatively low salaries. Staff retention has proven difficult in the past and if ESPOL does not take serious measures, there will be the risk that in 2012 a shiny new CIBE centre will be built in the PARKON knowledge park, without any experienced staff</p>	3

	<p>working in it.</p> <p>CIBE should do more effort to have commercial partners paying for research results, such as e.g. SEBIOCA, a commercial banana plant production enterprise within the university campus, which relies on CIBE research results, but until now does not pay for them.</p> <p>During the last two years CIBE started expanding research topics from banana towards other plants such as sugar cane, cacao, coffee, <i>naranjilla</i>, <i>malanga</i> and <i>papa china</i>. This is explicitly promoted by the ESPOL authorities through objective 23 in the 2008-2012 strategic plan. Although some diversification is considered healthy and wise, it might be commendable that CIBE does not spread itself too thin and concentrates on some strategic research topics.</p> <p>CIBE, together with Leuven University and Wageningen University has developed an extensive research project, including the training of 20 MSc and 10 PhD. The project has been presented for financing to the Ministry of Agriculture which seems committed to finance (part of) it.</p>	
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Overall Assessment of Project 3:

1. The overall objective has to some extent been achieved: Biotechnology capacity has been created for sustainable, environmental and social development for Ecuadorian agriculture. However, not all results have been obtained.
2. The centre is well equipped and is well renowned at national and to some extent also international level.
3. The staff situation is worrying, the critical mass is too small (only two PhDs) and the remainder of the staff are working under temporary contracts.

Recommendations regarding Project 3:

1. ESPOL should strengthen CIBE not only in terms of infrastructure, but also in terms of human resources: integrate more PhDs to form a firm critical mass and provide stability towards other staff members.
2. CIBE might reconsider the diversification of its research lines and concentrate on a few strategic topics in which it can present added value.
3. CIBE should do more effort to have commercial partners paying for research results.

Project 4. Environmental management systems in agriculture and aquaculture (EMSAA)

The IUC-EMSAA project was a follow-up on the Own Initiatives' project which started in 1996 in cooperation between Free University Brussels, Ghent University and ESPOL. This was a multidisciplinary project with geology, pharmaceutical biology, software development, data mining, GIS, etc. EMSAA was built upon various units, faculties and centres within ESPOL and did not aim at creating another one. At the end of the first phase EMSAA worked with human resources and infrastructure of three faculties and three university centres and at the end of phase two this was extended towards five faculties and three research centres. On 19 February 2008 CADS was founded (Centre for Water and Sustainable Development), a trans-disciplinary²

² This type of research refers to the process in which convergence occurs between disciplines, accompanied by a mutual integration of disciplinary epistemologies. A trans-disciplinary style of research can only emerge if the experts interact in an open manner and through dialogue, accepting each perspective as equally important and relating the different perspectives between each other.

centre with the mission of presenting technical solutions to water problems affecting sustainable development of society with ethics and responsibility, through research, development, and extension. CADS still is not a separate unit, but reunites experts and researchers from various ESPOL faculties and centres. Its 'core team' exists of 26 scholars, of which 10 PhD degree holders.

During the first phase EMSAA worked around fungicides in the banana sector; benthos as indicators for shrimp populations and a shrimp aquaculture alert system was developed. During the second phase the scope was broadened towards the development of expert systems for decision making in environmental issues.

The overall objectives for the second phase were:

1. The use of Environmental Management Systems and Tools has contributed to the decline of environmental degradation and to the progress towards sustainability of the Ecuadorian Coastal Region
2. The institutional capacity of ESPOL to generate relevant research based knowledge and services in environmental management and policy is enhanced.

The following specific objective was defined:

1. Through the development and subsequent promotion of environmental management tools, ESPOL is meeting the international standards for recognition as a Reference Centre to support Environmental Assessment and Decision-Making in Ecuador.

Assessment of KRAs Project 4

Key result areas	Indicators (quantitative and full descriptive data) / Comments	Score
KRA 1: Research	Publications during both phases count to 63, of which 17 in international peer reviewed journals. Research is transdisciplinary and combines scientific elements with applicability.	5
KRA 2. Teaching	EMSAA project team is involved in teaching activities at pre- and postgraduate level. At postgraduate level, the MSc in Environmental Sciences was developed. It runs under the responsibility of Chemistry and Environmental Sciences Institute (ICQA), and it is supervised by ESPOL Post-graduate Council. It has 19 participants and offers two specializations. In addition, a Program in M.Sc. in Aquatic Sciences is under preparation together with the University of Cuenca. This MSc has been approved by the ESPOL authorities and is now under consideration of University of Cuenca authorities. After approval by University of Cuenca, the programme must be approved by CONESUP. However, because of the pending reorganisation in Higher Education administration, this approval process may take longer than expected.	4
KRA 3: Extension and outreach	EMSAA explicitly aimed at an impact outside ESPOL, through the development and application of environmental tools and training of environmental stakeholders. Over 20 workshops have been organized.	4
KRA 4: Management	Project management has been smooth and relatively stable. CADS' management is in hands of a temporary director, now	3

	that Pilar Cornejo has a government function. As relations have been quite horizontal and responsibilities were shared, this seems to work well.	
KRA 5: Human resources development	Four PhD candidates obtained their degree and two are in their final stages. All new PhDs were integrated as nominated ESPOL staff. Some PhD candidates received pre-doctorate or MSc training.	3
KRA 6: Infrastructure Management	Project 4 chose for strengthening existing laboratories within the faculties, instead of concentrating them within CADS (and alienating them from their 'parents'). Within the new CADS building at the PARCON, only a GIS laboratory will be accommodated.	4
KRA 7: Mobilisation of additional resources/opportunities	The VLIR programme opened up possibilities for other resources, such as the UNESCO HELP programme, which in its turn opened up possibilities for the European Union's 7 th Framework Programme. Seven participants in the MSc in Environmental Sciences are supported with BTC scholarships and seven with IESE study loans. CADS is one of the first centres that will be located in the ESPOL PARCON Knowledge Park. Funding has been set aside in the ESPOL budget and construction has started.	4

Qualitative evaluation Project 4

Qualitative evaluation criteria	Indicators / Comments	Score
1. Quality	Three project members have received ESPOL awards and one member (the project coordinator) received an international award (2007 Rachel Carson Award, by the American Geophysical Union). Two project members were called to fulfil government functions: as the National Secretary Risk Management and as Minister of Agriculture, which can be seen as an indicator of quality. The recommendation of the mid-term evaluation, that EMSAA should integrate its research lines and evolve into a 'Centre of Environmental Studies' has been followed up in the second phase with the conformation of CADS.	4
2. Effectiveness	EMSAA seems to have achieved its specific objective, with the creation of the Centre for Water and Sustainable Development, which receives strong support from the ESPOL authorities. The planned results have been achieved, except for the application of the environmental tool by a River management authority, because of changes in national policy (re-centralisation of water responsibilities). However, other tools are being applied. Although not all PhD candidates have finished in time, it is expected that the remaining two will be integrated as ESPOL staff before the end of this year.	3
3. Efficiency	The project has managed to find additional funding, by increasing interactions with ESPOL and with other components of the current programme by jointly applying and receiving	3

	<p>additional funds from other sources (collaboration among components 3, 4 and 5). On the Belgian side both Free University Brussels and Ghent University are involved and both are very much appreciated.</p>	
4. Impact	<p>The project aimed at an impact on Ecuadorian (or more specifically coastal) environment and it seems that this is achievable, as municipal and river authorities have been trained and specific tools have been developed and are being implemented partly. Impact on Integrated River Basin Management in Ecuador has been limited by national policy changes (centralisation of River authority) since 2008. However on the international level there may be some impact through the participation and regional coordination of the UNESCO HELP programme. Benthos as indicator for coastal environmental management has been applied by two municipalities.</p> <p>The project team advises national and regional government (for example the Guayas emergency plan and the mitigation plan for effects of variability in the rainy seasons). It may be expected that through the appointment of the National Secretary Risk Management and the Minister of Agriculture there will be more impact on national policies.</p>	4
5. Development relevance	<p>Water and environmental sustainability are highly relevant for Ecuador. Risks are presented by natural phenomenons (e.g. El Niño which regularly affects Ecuador with extreme floodings, earthquakes, white spot disease in shrimp, etc) but also by human acting: pest control in banana production, mine exploitation, pollution, etc. The development of expert systems for decision making in environmental issues is crucial to be able to take quick actions in environmental emergencies and the appointment of the project director as National Secretary Risk Management is a clear indication that the Ecuadorian government acknowledges the relevance of these issues.</p>	4
6. Sustainability	<p>The project always functioned more as a network than as 'another institute' within ESPOL. Sustainability of project results will depend on whether the dynamics of cooperation or 'transdisciplinarity' will be maintained. Several factors indicate that this will actually be achieved:</p> <ul style="list-style-type: none"> • Existing structures have been strengthened and relationship with faculties are strong; • All four PhDs produced by the project have been integrated on the basis of fixed nominations and ESPOL rector guarantees to do the same with the final two who are still underway; • ESPOL commitment by creating CADS and giving it priority within PARCON; • Recognition by international organizations such as UNESCO; • The importance of the subject for the coastal area and Ecuador in general. <p>Even if PARCON will not be realised, we are confident that EMSAA's results are sufficiently institutionalised in ESPOL's</p>	4

	traditional structure (faculties, research centres and laboratories) to be maintained.	
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Overall assessment of Project 4:

1. EMSAA gave origin to the creation of a Centre for Water and Sustainable Development without weakening ties with ESPOL's faculties and research centres.
2. EMSAA was successful in obtaining most of its planned results.
3. Application of one of the project results was impossible because of changes in national policy regarding river authority.

Recommendations regarding Project 4:

1. ESPOL must fulfil its commitments regarding the integration of PhD students as ESPOL staff members
2. ESPOL (including the faculty deans) must continue supporting and contributing to the Centre for Water and Sustainable Development.

Project 5. Management techniques for sustainable aquaculture

The relations between Ghent University and ESPOL go back to the late seventies, when ESPOL staff participated in the International MSc in Ghent University and invited Prof. Sorgeloos to Ecuador. Shrimp production was incipient at that time. In the beginning of the eighties Belgian bilateral cooperation (ABOS at that time) supported the development of a modest research centre at the Pacific coast, organising in addition some practical courses for the shrimp laboratories. In 1988/1989 the Japanese government made a large investment in this research centre. The *Centro Nacional de Acuicultura e Investigaciones Marinas* (CENAIM) was thus born in 1990. It was fully equipped with Japanese funding and various Japanese resident and visiting researchers worked in the centre. BTC (Belgian Technical Cooperation) funded the continuous presence of two or three researchers from Ghent University and funded also the development and implementation of the Master course in Marine Aquaculture. In 1996 Leuven University started a research project (VLIR own initiatives - OI) in collaboration with CENAIM and Ghent University, which resulted in additional PhD staff at CENAIM, who later on became the Ecuadorian promoter of component 5. When Japanese support ended, a foundation CENAIM-ESPOL was created with majority participation of the private sector and a minority participation of ESPOL. The first two directors, however, came from ESPOL and succeeded very well in balancing between the longer term needs of research efforts and the shorter term interests of the private sector. In 1999 the VLIR-OI cooperation between Leuven University, Ghent University and CENAIM was integrated in the IUC programme with ESPOL. During the first years CENAIM expanded and developed itself into 'an excellent and well established component, of international repute, situated in one of Ecuador's most important economic sectors (shrimp cultivation)³. The centre, located at the Pacific coast, has 12 laboratories, 22 experimental sets and an experimental station with 83 experimental pools. However, in 2009 the foundation encountered serious problems. It had invested great part of its capital in Ecuadorian swaps of foreign debt that the present government refused to pay. In addition it was financed by revenues from income taxes. These sources of income were cut by the actual government and CENAIM went bankrupt. The situation was solved when the foundation was dissolved and ESPOL took over all responsibilities in August 2009. CENAIM is now 100% ESPOL. Therefore ESPOL negotiated funding with the Ministry of Agriculture. All 80 members of staff, of which 5 PhDs and three MScs, are now contracted by ESPOL. Although these are annual contracts, the rector of ESPOL has committed himself to absorbing all CENAIM staff into ESPOL.

Component 5 has three research lines: Shrimp physiology, shrimp nutrition and larviculture. Shrimp physiology (with one PhD candidate that obtained her PhD) is followed up by the Leuven University, and

³ Midterm evaluation, September 2002

shrimp nutrition and larviculture (with two PhD candidates) are guided by Ghent University.

The overall objectives for the second phase were:

1. The institutional capacity of ESPOL to generate relevant research based knowledge and services in strategic areas of national development and provide innovative quality training is enhanced, as well as create a local capacity to compete for national and international financing or funding or research projects.
2. The research basis to enhance the sustainability and productivity of the shrimp production sector is strengthened.

The specific objectives for the second phase were:

1. To stimulate multidisciplinary scientific interaction among the Centre of Aquaculture of the Faculty of Marine Sciences and the Faculty of Engineering, in order to consolidate research in both institutes.
2. To increase human capacity of ESPOL, through PhD programme.

Assessment of KRAs Project 5

Key result areas	Indicators (quantitative and full descriptive data)	Score
KRA 1: Research	<p>The project's self assessment mentions 50 publications in both project phases, of which five in international peer reviewed journals. One PhD candidate presented her research in English at the 23rd Conference of European Comparative Endocrinologists in Manchester.</p> <p>The achievements in publications for the second phase did not equal the original expectations, because of the pull out of the PhD candidates and researchers.</p> <p>Research was hampered by problems with experiments which is part of working with live material, and which caused a lot of delay.</p>	3
KRA 2. Teaching	<p>CENAIM was involved in the MSc Course in Marine Aquaculture from 1999 till 2006 (6 promotions, 35 Ecuadorian and international participants). The course was organized in collaboration with Ghent and Leuven Universities and was financed by BTC. When the BTC funding ended (sooner than originally planned), the course was stopped. It was not possible to continue the course on a self sustaining basis, as Ecuador cannot compete with other countries as destination for international students and after the shrimp crisis in Ecuador there was not enough demand from national participants.</p> <p>In 2005 and 2006 two international (2-weeks) courses were given on Molecular Techniques in Aquaculture.</p> <p>Various under- and post graduate students from national and international universities make use of CENAIM for thesis research.</p>	3
KRA 3: Extension and outreach	<p>During the first phase the SAEMA alert system (Sistema de Alerta Epidemiológico y de Manejo Acuícola - Warning System for Epidemics and Water Management) was developed in the framework of P4 and made accessible for aquaculture producers. The system is an early warning system for shrimp diseases and is accessible through the CENAIM website.</p> <p>In May 2009 an intensive course was organised for shrimp producers to extend research results to the private sector.</p>	4

	<p>November 2009 a proteomics course was organised for three CIBE staff.</p> <p>CENAİM edits a two-weekly news bulletin in to inform the private sector of recent research results.</p> <p>CENAİM assesses the recently founded University of Santa Elena on its marine biology career.</p>	
KRA 4: Management	<p>The project's management suffered from some changes. The original project coordinator, who was also CENAİM director, had to leave CENAİM because of health problems. The second project coordinator operated under a CENAİM director who came from the private sector and whose interests did not always coincide with the project's objectives. This project coordinator left CENAİM after eight years and was replaced by the present project coordinator. The CENAİM director had to leave when the foundation was dissolved and is replaced by a temporary director while a permanent director is being sought. In spite of these changes, project management has always been smooth and under direct control of the Ecuadorian staff.</p>	3
KRA 5: Human resources development	<p>Of three PhD candidates which started during the first phase, only one obtained her degree. However, she left CENAİM for personal reasons.. A second candidate left CENAİM for economic reasons even before obtaining his title. The third candidate suffered a lot of delay because of technical and personal problems but is expected to obtain her degree in 2010. One CENAİM researcher obtained her PhD degree with a BTC scholarship and VLIR/ESPOL co-funding. She is still working in the centre. Although other human resources were trained (seven M.Sc. students, several specialized trainings, 18 undergraduate students, 32 trainings of high school students) these do not concern CENAİM staff.</p>	2
KRA 6: Infrastructure Management	<p>The centre, which was equipped with state of the art materials at the beginning of the cooperation, needs updating, except for the proteomics equipment which was acquired during the second phase.</p>	2
KRA 7: Mobilisation of additional resources/opportunities	<p>Some additional resources were obtained through VLIR/ESPOL competitive funding, in cooperation with other components. BTC financed the MSc in Marine aquaculture during six promotions. BTC also financed a PhD scholarship for one CENAİM staff. After the project's ending ESPOL negotiated funding with the Ministry of Agriculture for taking over CENAİM.</p>	4

Qualitative evaluation Project 5

Qualitative evaluation criteria	Indicators / Comments	Score
1. Quality	<p>CENAİM scientific staff is composed by some 80 members among which 13 technicians and eight researchers, from which five have Ph.D. and three have M.Sc. degree (two of them are in the last phase to obtain their Ph.D.).</p> <p>Although the centre broadened its research topics including other species such as fish and crustaceans, overall it lost much</p>	2

	<p>of its quality during the latest years.</p> <p>Through the international MSc course on Marine Aquaculture, CENAİM had relations with many researchers from other Latin-American countries and scientific input through their thesis researches. Now that the MSc course is no longer organized, these contacts and inputs will gradually fade and eventually disappear.</p>	
2. Effectiveness	<p>Most results have been achieved but not all PhDs will be obtained (in time). The departure of one of the PhD candidates forced the project to adapt its objectives as it was no longer possible to work in one of the three research lines (nutrition).</p>	2
3. Efficiency	<p>VLIR Funds, although relatively limited in comparison with other projects, have been used to the maximum. Staff of Project 5 has adapted to changes and problems were surpassed.</p> <p>Original funding by VLIR was no doubt a crucial factor. However, the project has managed to find additional funding, by increasing interactions with ESPOL and with other components of the current programme by jointly applying and receiving additional funds from other sources (collaboration among components 3, 4 and 5).</p>	3
4. Impact	<p>CENAİM used to be managed by a foundation with participation of ESPOL and the private sector. There was therefore a direct link with the private sector. A scientific committee defined the subjects for research. Now CENAİM is integral part of ESPOL.</p> <p>However the centre continues activities with the private sector, such as short courses, early warning system and annual congresses.</p> <p>Through its training activities and (former) MSc Course, an impact is achieved in education and private sector in Ecuador and in Latin America (seven M.Sc. students, several specialized trainings, 18 undergraduate students, 32 trainings of high school students).</p>	4
5. Development relevance	<p>Fish and shrimp culture are important species for Ecuadorian economy. Although the sector suffered from the shrimp crisis, caused by the white spot disease, this in itself shows the importance of scientific research to detect and prevent diseases, as well as to diversify species. The CENAİM topics align with the national priorities of the MAGAP (Ministry of Agriculture, Fisheries and Aquaculture).</p>	4
6. Sustainability	<p>CENAİM is in a transition process. Recently the centre has been taken over by ESPOL, including all labour contracts. Although salaries and benefits improved with this take-over, the contracts do not exceed the end of this year. ESPOL negotiated funding for this take-over with the Ministry of Agriculture and foresees also replacement of part of the equipment. It is not clear what will happen when this funding ends. However, ESPOL authorities are committed to support CENAİM and its staff in order to regain its former strength. In 2010 ESPOL decided that CENAİM would be part of PARCON.</p> <p>Cooperation with KULeuven and Ghent University has been constant since 30 years and UGhent plans to continue the cooperation, now also involving partners from Cuenca and Vietnam. The KULeuven promoter plans to continue to</p>	3

	collaborate with CENAIM researchers in the field of physiology and proteomics, but not anymore in a VLIR-UOS context.	
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Overall assessment of Project 5.

1. After a long cooperation history with ups and downs, CENAIM now is in a weak position because of political, financial and natural (shrimp disease) factors.
2. Although not directly part of the IUC programme, the BTC funded MSc Course in Aquatic Sciences was very important for CENAIM in terms of research/education-cross-fertilisation and spin-off towards other organizations in Ecuador and in Latin-America.
3. CENAIM has good potential for the future in terms of staff and infrastructure, but needs consolidation.
4. CENAIM is working in a relevant sector for Ecuadorian economy.

Recommendations regarding Project 5.

1. ESPOL should invest in CENAIMs human resources: more staff should be upgraded to PhD level; salaries should be increased in order to retain trained staff; contracts should be permanent instead of temporary.
2. ESPOL should develop a sustainability plan, securing funding for operation, maintenance and replacement of equipment.
3. CENAIM should reconsider its research topics and concentrate on fewer topics in order to achieve more quality.
4. CENAIM should look for ways to restart postgraduate education to attract students and research assistants and to feed on the research processes.

Project 6: Research applications of non-metallic materials

Project 6 started out as a fully new effort at ESPOL in phase 2, and as collaboration between several researchers coming from different Faculties (in particular within the FIMCP (Mechanical Engineering and Production Sciences) and FICT (Earth Science and Engineering)). As such, it has been different from other projects, as it did not start out as an existing research centre, but rather as a group that gained cohesion and experience along the way. This way, several professors of both faculties managed to be considered as researchers.

One crucial activity of the project has been to map (with GIS) the existence of different non-metallic materials in the region. A second has been to work together with local communities explaining the possible uses of these materials. For example, the zeolites existing in the area can be used as material for filters. Another use is for the elaboration of cement.

Over the years, the project has acquired several laboratories (combining VLIR and institutional funding) that are currently going through a process of outside certification (ISO) in order to provide services to third parties. Research and development of non-metallic materials has become an important research area. It is now approved by the research council, and has received funds for laboratories (The LEMAT laboratory (*Laboratorio de Ensayos Metrológicos y de Materiales*) has a Scanning Electron Microscope, X-ray Diffractometer, Thermal Analyzers (TGA/DSC), Optical Microscopes, Mechanical Testing Machines). The new nanotechnology laboratory (CIDNA) that is considered in the plans for PARCON can also be considered as a spin off of project 6.

Phase 2 objectives for project 6 were:

- Exploring the existence and possible use of non-metallic materials of the Coastal Region, related to projects that could improve productivity and quality of life in the region.
- Use the knowledge to improve teaching and research at the ESPOL on non-metallic materials.

Assessment of KRAs Project 6

Key result areas	Indicators (quantitative and full descriptive data)	Score
KRA 1: Research	The project reports over 12 publications by 2010, though most in Spanish. One book is in press. There has been an acceptable participation in international congresses. There was one peer-reviewed publication in an international journal.	3
KRA 2. Teaching	All participants in the project remain closely related to their original faculties. The project had a direct impact on undergraduate teaching, not only because the students benefited of the investment done but the major benefit was the capability of transmitting the knowledge received by the project team in countries like Belgium. At FICT the majority of benefited students were those from Mining Engineering and Geological Engineering. In the case of the FIMCP, the Materials Department improved its laboratories and the content of the courses Materials Science, Engineering Materials, and Industrial Materials, was modified to include notions on non-metallic materials. Currently, the students from Mechanical Engineering and Industrial Engineering participate in laboratory sessions that were not possible to execute before. The project team is now preparing a Master course in Sciences in Materials with other Ecuadorian universities and the support of Leuven University through a VLIR Research fund (RIP).	4
KRA 3: Extension and outreach	The project is closely related to applications in often poor communities: the use of materials for filters, construction materials, etc. An interesting example has been a social development project done together with Project 7 (Entrepreneurs Development Program) at the community of San Rafael. This project was also important because it included the participation of ESPOL's Youth Enterprise, i.e. an important number of students.	3
KRA 4: Management	The project has been well managed, complementing VLIR funding with other resources.	3
KRA 5: Human resources development	One PhD is expected to finish in 2010. This candidate is already working on a permanent position and is actually Quality Director of the LEMAT laboratory. Another candidate participated in a (Dutch language) MSc course at Leuven University but was not offered a position in ESPOL. Other PhDs and MSc have been achieved or are in process of being obtained paid by other funds. It is important to note that this project remains closely related to the Faculties, and that many undergraduates (over 18) have elaborated their thesis while working at the centre.	3
KRA 6: Infrastructure Management	The LEMAT laboratory now counts with state of the art equipment (funded mostly by the university itself) and laboratories are currently going through the process of outside certification (ISO) in order to provide services to outside parties.	4
KRA 7: Mobilisation of additional resources/opportunities	The project has been able to mobilise considerable additional resources. The investment component of the VLIR project was little over EUR 80.000. ESPOL invested US\$ 1 million in the LEMAT laboratory which will be complemented with US\$ 1, 5 million by the Ministry of Industry. Finally an investment of US\$	5

	7 million is expected from SENPLADES for the CIDNA laboratory in the PARCON. However, this is not yet formalised.	
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Qualitative evaluation Project 6

Qualitative evaluation criteria	Indicators / Comments	Score
1. Quality	Good quality has been obtained in terms of infrastructure, applied research and pregraduate education. The LEMAT laboratory is currently going through a process of outside certification (ISO).	4
2. Effectiveness	Most planned results have been achieved as well as the specific objectives.	4
3. Efficiency	The fact that this project is located at two Faculties and involves various laboratories and different study fields did complicate somehow the implementation and internal communication. The ESPOL project coordination successfully achieved to cope with this complication. On the other hand, the fact that the project started only in the second phase, had the advantage that many processes were already established.	3
4. Impact	There has been some impact in working with local communities. This could be enhanced, strengthening with a socio-economic perspective. There is potential for impact at local and national level, through service provision to third parties.	3
5. Development relevance	Development relevance for Ecuador is high taking into account the need expressed by the Ecuadorian government to diversify and find alternative production sectors.	4
6. Sustainability	<p>The LEMAT laboratory has by now the necessary equipment (even some state of the art laboratories) to provide services to industry and researchers. The public sector pays full costs for its services while investigators pay only 3, 5% overhead. As such, the laboratory is sustainable. There has also been a gradual incorporation of new personnel with PhDs or nearly graduated. The proposal for the creation of CIDNA needs a good development plan in order to make the transition to PARCON. In this aspect it should be worked out how the new centre will continue to collaborate with the Faculties.</p> <p>Although external financing for the CIDNA laboratory in the PARCON has not been secured yet, the commitment from ESPOL authorities is an important factor for the future. The project is clearly sustainable, and can become more so providing services in the region. After the ISO certification, a plan should be established to provide services to third parties.</p> <p>Cooperation with VLIR is secured for the coming years through a RIP fund to support ESPOL in the preparation of the Master course in Sciences in Materials with other Ecuadorian universities and the support of Leuven University.</p>	4

Overall assessment project 6

1. The project has developed rapidly, considering that most of its integrants were teachers at two faculties. Starting from scratch, a group of different academics has managed to set up a research

- centre that is clearly useful and sustainable in the coming years. It should be taken in consideration that the project only entered in phase 2, and thus has had only 6 years to develop and consolidate.
2. Collaboration with Belgian counterparts has been good, and should be maintained.

Recommendations project 6

1. Academic and auxiliary staff should be strengthened. At this moment, the possibilities provided by the excellent infrastructure surpass the capacities of the human resources available.
2. The agenda at ESPOL is to create a research centre for nanotechnology (CIDNA). The centre has a very broad research agenda, with little staff. Perhaps it would be wise to focus on one or two central topics in the next few years.
3. A clear agenda for future collaboration with the Faculties should be established, especially when CIDNA is established at PARCON. Close collaboration with Faculties has been strength of the project.
4. The project lacks a link to postgraduate programs, which means that most collaborators are recent undergraduates. The master's programme that is currently under preparation, could improve this situation.

Project 7: Entrepreneurship development programme

This project only started with the second phase of the VLIR-UOS cooperation and is implemented in all faculties of ESPOL. Project coordination resides in ESPAE, the ESPOL Graduate School of Management, at the Las Peñas campus. The Entrepreneurial Development Centre (CEEMP) is located at the Faculty of Electrical Engineering and Computer Science and the ESPOL Junior Enterprise (EJE) is located within the Faculty of Mechanical Engineering and Production Sciences.

Overall objectives:

1. Ecuadorean companies improve their competitiveness;
2. The institutional capacity of ESPOL to generate relevant research based knowledge and services in strategic areas of national development, and provide innovative quality training is enhanced. Leadership and local reference in entrepreneurship is attained.

Specific objective:

ESPOL develops its own educational model in entrepreneurship, thus entrepreneurial skills and orientation of the faculty and graduates of ESPOL have been enhanced.

The project aimed at delivering three main results: an Entrepreneurial Development Centre; a Junior Enterprise and academic and research capacity in entrepreneurship attained through faculty development entrepreneurship.

Assessment of KRAs Project 7

Key result areas	Indicators (quantitative and full descriptive data) / Comments	Score
KRA 1: Research	ESPAE and CEEMP are involved in some research efforts on (Education in) Entrepreneurship. Of a total of 34 publications, two have been published in an international peer reviewed journal and three have been submitted for acceptance. Apart from the PhD research lines, ESPAE does the research for the Ecuador chapter of the Global Entrepreneurship Monitor.	3
KRA 2. Teaching	An undergraduate course Entrepreneurship and Innovation was developed by Ecuadorian and Belgian experts. This course have been organised for all undergraduate students as a mandatory course. 5.500 Students have participated in the course until now. The teachers of the course are staff of the various faculties. Of 40 teachers who have been trained	4

	initially, 24 were qualified to teach and of these, 12 form a core team to dictate the course. However, all 40 teachers have been sensitized and support the entrepreneurial activities at their faculties. Didactic material was developed for the mandatory course as well as for the Training of Trainers course.	
KRA 3: Extension and outreach	ESPOL is a member of SEAFE (Ecuadorian System for Support of Entrepreneurship Education) and participates actively in various networks such as the Stanford University Roundtable on Entrepreneurship Education (REE). Various national and international events have been organized and project staff participated actively in international conferences in Venezuela and Colombia and dictated a workshop on training methodologies for entrepreneurship education for staff of Universidad del Norte in Colombia.	3
KRA 4: Management	Project management is reported by both Belgian and Ecuadorian coordinator to have been smooth and well organised by the Ecuadorian project team.	3
KRA 5: Human resources development	Two MSc degrees have been obtained at the University of Ghent Master Course in Operations and Technology Management. One of them, although having a fixed nomination at ESPOL, left for personal reasons for Brazil. The other was offered a nomination at the Faculty of Industrial Engineering and is now pursuing a PhD at Ghent University with ESPOL funding. In addition two PhD scholarships were part of the programme: one PhD holder is now the director of CEEMP, the other candidate (Mechanical Engineer) has not yet finished and hopes to receive his degree before the end of 2010 and subsequently be offered a fixed nomination at ESPOL. In addition 40 lecturers of all faculties have been trained in a local Training of Trainers course.	3
KRA 6: Infrastructure Management	There has been some investments in office furniture and equipment for CEEMP and EJE.	3
KRA 7: Mobilisation of additional resources/opportunities	In 2004 CEEMP, together with other Ecuadorian universities, obtained a CAF (Corporación Andina de Fomento) grant for course development and development of teaching material. In 2007 CEEMP obtained funding from two oil companies. ESPOL funds an extra PhD scholarship in Belgium in the framework of the project.	3

Qualitative evaluation Project 7

Qualitative evaluation criteria	Indicators / Comments	Score
1. Quality	No specific tracer studies have been conducted in order to measure the effect of the mandatory entrepreneurial course. However, it is known from other studies, that graduates do not create their own enterprises until six or seven years after having graduated. In general the quality of the courses was evaluated positively by the participants. An assessment of the achievement of specific competencies was done mainly through Edgar Izquierdo doctoral dissertation. The impact of the Junior Enterprise (EJE) was assessed through	3

	a research project that compared EJE members with non EJE members and with the project team. The research confirmed the hypothesis that active participation in EJE increases the entrepreneurial spirit of the students.	
2. Effectiveness	The main results and specific objective have been or are being achieved to some extent. CEEMP and EJE have been established, the undergraduate course is well developed and institutionalised, one PhD and one MSc have been integrated as staff and one PhD is still expected). It was, however, foreseen that for example EJE would have much more spin off inside and outside the Faculty of Mechanical Engineering and Production Sciences, more student participation and student projects were planned for in the EJE, etc.	3
3. Efficiency	The fact that the various components of the project were shattered over different university units (and campuses) did not facilitate mutual strengthening and integration. EJE for example would have benefited from a more frequent interaction or even integration with CEEMP. Frequent turnover of EJE student members, although part of the model and therefore inevitable, affected dynamism and continuity. The selection of PhD candidates proved more difficult than foreseen, because of the 'uncertainty of their future career at ESPOL' (project self assessment). It was difficult to find good candidates. The input of the project coordinator from Ghent university, and other Belgian experts, was very much appreciated by the Ecuadorian project team.	3
4. Impact	Impact within the university is caused by the training and sensibilisation of 40 faculty teachers in entrepreneurship. Furthermore CEEMP organises an annual Entrepreneurship Week at ESPOL as well as the ESPOL Innova Contest which both have the aim of promoting entrepreneurship among students and staff. Outside the university there is an impact through the projects developed in the framework of the EJE. Furthermore, students who develop mini-businesses in the framework of the mandatory entrepreneurship course donate all profits (if generated) to social institutions (social responsibility). In addition project staff engages in staff training at other Ecuadorian universities.	3
5. Development relevance	Small businesses are considered as a solution for Ecuadorian unemployment. In ESPOL's strategic plan 2008-2012 the low productivity and competitiveness of Ecuadorian enterprises is mentioned as one of the threads in the institutional SWOT analysis. Improving entrepreneurship not only has to lead to the creation of new enterprises, but can also add to the competitiveness within enterprises.	4
6. Sustainability	The distance between the various project components weakens their institutional embedding. CEEMP did not achieve financial self sustainability during the project implementation, as was planned. Although some results are well embedded in ESPOL, such as the undergraduate teaching, for other activities it might be difficult to secure steady funding. On the other	3

	hand, ESPOL strategic plan 2008-2012 explicitly mentions the aim to strengthen entrepreneurial culture in ESPOL and in the country, through CEEMP (objective 38).	
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Overall Assessment of Project 7:

1. The project achieved (or will achieve) most of its planned results, however not in the extent as originally foreseen.
2. Entrepreneurship development is a relevant topic for ESPOL and for Ecuador.
3. Sustainability of all project results is not secured.

Recommendations regarding Project 7:

1. ESPOL should enhance the integration between the various components such as CEEMP, EJE and ESPAE.
2. ESPOL should strengthen EJE and replicate the experience towards other faculties.
3. Serious efforts must be done to make project results self-sustainable.

Project 8: Education and Research Capabilities Development Programme for software engineering, telecommunications and robotics

Project 8 is in reality an amalgam of three projects: Software engineering, Computer vision & Robotics, and Telecommunications. The three lines were grouped together in phase two of the VLIR-ESPOL collaboration. Though the three work together on some themes, it is also clear that each one has its particular agenda.

Project 8 is also one that did not start from an existing research centre. Instead, the second round of calls for projects lead to a collaboration of different researcher around some central themes, most of them coming from the Electrical and Computer Engineering Department (FIEC). As such, the project, like project 6, has a strong basis in one of the Faculties, but started out with academics that had little experience in doing research. The objectives of the project are:

- Overall objective: The research, education, product and service development capabilities of the Electrical and Computer Engineering Department at ESPOL are strengthened.
- Specific objective: The Computer Engineering program at ESPOL is improved and the conditions for developing research in order to introduce high quality standards into the Ecuadorian Software Industry are established at ESPOL.

Assessment of KRAs Project 8

Key result areas	Indicators (quantitative and full descriptive data) / Comments	Score
KRA 1: Research	The project has reported 71 publications, of which 12 in international peer reviewed journals. In addition many research activities have been geared towards practical issues, and is disseminated through conferences (in Spanish).	4
KRA 2. Teaching	The transfer of learning materials and training of trainers in pregraduate education has been the most successful part of the project. Curriculum contents were updated and new subjects were created, as well as pedagogical tools. Collaborators of the project remain attached to the FIEC, teaching undergraduate courses.	4
KRA 3: Extension and	The group works together with several outside entities in	3

outreach	software development and robotic applications, including the private sector and government agencies. Also regular conferences have been organised at a national level such as the National Robotics Contest, the National Software Symposium (JIS), and the Telecommunication Systems Symposium (JST). Additionally, some courses of the Merode method were taught in Ecuador	
KRA 4: Management	The fact that this project is a conglomeration of three different project proposals and involves various laboratories and different study fields did complicate somehow management and internal communication. The ESPOL project coordination successfully achieved to cope with this complication. The original project coordinator left to pursue a PhD degree in the US.	3
KRA 5: Human resources development	There were two PhDs planned in the project. One PhD student chose to stay in Belgium and did not accept the sandwich modality that was mandatory by VLIR. Although this candidate formally was lost for the project, relations are maintained on an informal basis (the candidate dictated a class from Belgium by teleconferencing). A second is expected to finish in 2010. In addition, there have been several stays in Belgium for short, practical training courses.	2/3
KRA 6: Infrastructure Management	One laboratory has been created with the IUC programme (CIDIS) and another one was strengthened Computer Vision & Robotics (CVR). The Telecommunications laboratory is working well, but has had the setback that the PhD student chose to stay in Belgium.	3
KRA 7: Mobilisation of additional resources/opportunities	Some small activities were financed with external funds. In addition some ESPOL funds were won through competition.	3

Qualitative evaluation Project 8

Qualitative evaluation criteria	Indicators / Comments	Score
1. Quality	The groups are starting to produce interesting results, but are still under construction. Some staff members are only recently pursuing postgraduate studies, which means that the current staff base of the groups is very weak.	3
2. Effectiveness	The Software and Robotics components developed satisfactorily; however, the money assigned to the Telecommunications sub-component was little used, due to the fact that the PhD candidate leading this area chose to stay in Belgium. This has meant in practice that some infrastructure and equipment has been used very little.	3
3. Efficiency	Much has been done with little money. There have been relatively few contacts with the Flemish experts. Both Prof. Dedene and Dr Snoeck (Leuven University) visited the project once.	3
4. Impact	Impact has been little up till now, considering the specific objective of introducing high quality standards in the Ecuadorian software industry. However, software development and robotics are establishing interesting (but only recent)	3

	collaborations with outside parties	
5. Development relevance	These are very relevant topics for Ecuadorian development, which are explicitly mentioned in the National Policy for Science, Technology and Innovation 2007-2010. Developing applied research projects will help increase productivity, and render quality services to the community.	4
6. Sustainability	CIDIS is one of the centres that will be located at the new PARCON. Although external financing for the CIDIS laboratory in the PARCON has not been secured yet, the commitment from ESPOL authorities is an important factor for the future. The fact that project results are shattered over various research groups and laboratories does not contribute easily to their sustainability. In addition many staff members are abroad for PhD studies and even more are still planned. Staff retention has been a problem in the past, and will remain so in the future. In conclusion we think that sustainability will require some extra efforts but is possible in the longer term (when staff members with PhD are reintegrated and CIDIS has been established at PARCON).	3

Overall evaluation project 8

1. Project 8 is a conglomerate of three different components, which each have had their own development. While Software Development and Robotics were quite successful in achieving the planned results, Telecommunication suffered a setback because the PhD candidate in this field decided to stay in Belgium and was cut off the project.
2. Staff training by the project was modest and only one PhD degree will be obtained during this year.
3. The project has presented several interesting proposals, but it remains a conglomeration of several research interests, with little experience and only a small core of qualified researchers working on different themes.
4. At the time of our visit various staff members, including the original project coordinator, had left for PhD studies. Although this is a good move, it left us some doubts about the near future of the project, which includes the transition to PARCON. In our view the project has been successful over the last six years, but future plans are not very coherent and also highly dependent on just a few people.

Recommendations project 8

1. ESPOL should do a serious effort to broaden and strengthen (in terms of permanent positions) the staff bases of the various research groups and laboratories.
2. Although CIDIS developed its Strategic Plan and is part of PARCON, the other groups will need to work out a development plan for the near future together with the central authorities at ESPOL. The central theme will have to be staff development, possibly with the hiring of several outside PhDs.
3. ESPOL should strive for more coherence between the various research groups and laboratories.

6. Qualitative evaluation of the programme as a whole

The quality of the VLIR-UOS IUC programme at ESPOL has been evaluated against five criteria: quality, efficiency, impact, development relevance and sustainability. The findings of the evaluators are summarized in the following paragraphs.

6.1 Quality

Various recommendations of the mid-term evaluation have been followed up in the second phase: to enhance exchange and cooperation between components; more extension towards community in second phase; increased participation in national and international networks and increased publication of research results, making an already good cooperation even better. The quality of ESPOL is stressed by external actors and confirmed by the ISO certification of various centres and laboratories and by the very positive external evaluation by the Ecuadorian National Council for Evaluation and Accreditation. ESPOL is eager to constantly improve its quality for example through international accreditation processes (ABET, ACCSB and others) and investing in (or searching funding for) improvement programmes (PARCON, Doctoral Training Programme). ESPOL has been a very stable organisation. The last strike by academic staff, we were told, dates back to 1979 and lasted a couple of days. This stability means that improvement measures are institutionalised and are maintained disregarding political processes.

The writing and publication of international, peer reviewed articles, written in English, remains a point of controversy. In the case of our evaluation, one issue that caught our attention was that several PhD candidates were lagging behind schedule because they had to publish one or more internationally accepted papers before they could present their dissertation. While this seems common sense in Europe or the US, in Latin America it is not always the case. On many occasions, the language barrier is cited as a factor, but this cannot be the whole story, as many Latin-Americans (also within ESPOL) manage English very well. In the case of ESPOL funding was available for translations and for international publications of which not even 10% was used. Another factor mentioned, is the reward structures in Latin-American universities: publications in foreign journals often do not reward the writer with extra points to further his or her career. Although this is an element that gradually is being introduced in ESPOL award structure, and publications in A1 journals are now awarded with extra points, still there are other relatively more easy ways to obtain extra rewards. A third factor mentioned is that it makes no sense to write in English language journals, as these are not commonly read in Latin America. All in all we may conclude that, although the IUC programme gave research development within ESPOL a boost, it is still not entirely integrated in ESPOL. Or, as the Director of the ESPOL Research Centre stated: 'Writing is just not part of our culture'.

Still:

1. ESPOL is the Ecuadorian University that submits the largest number of projects to local funding agencies.
2. ESPOL is the Ecuadorian University with the largest number of projects supported by CONESUP, SENACYT and FUNDACYT.
3. ESPOL is the Ecuadorian University with most national and international publications. According to SENACYT data, ESPOL doubles in number of publication to the second best one.
4. ESPOLciencia has been established as a regular scientific event in ESPOL.
5. "*Tecnológica*" (ESPOL journal) has been indexed in Latindex.
6. Strategies to establish a research culture at ESPOL were implemented (CICYT, Research Council).

Another issue is the development and organization of post-graduate education at ESPOL. Although some MSc courses exist, these are limited in number and scope and there are no programmes at doctorate level. We certainly think ESPOL should strengthen postgraduate education. This was not an objective at the start of the VLIR-ESPOL collaboration. However, ten years later, it seems obvious that ESPOL can and needs to develop masters and PhD programmes in order to guarantee its future development.

6.2 Effectiveness

The above evaluation of the individual programme components give evidence that the ESPOL/VLIR-UOS cooperation definitely contributed to the achievement of the specific objectives:

- ESPOL is strengthened as an actor in Ecuadorian development;
- Knowledge and services have been generated through research in areas of impact for Ecuadorian development.

Some statements of the persons involved in the cooperation indicate the importance of the VLIR/IUC programme for ESPOL: 'VLIR opened up the world'; 'VLIR gave a boost to research culture'; 'VLIR changed our way of thinking'. All interviewed stated that without the IUC programme, ESPOL would not have been where it is now in terms of research culture and quality. Five out of six research centres that will form the ambitious PARCON knowledge park were either created or strengthened through the IUC cooperation: CTI (P2); CIBE (P3); CIDIS (P8); CIDNA (P6); CADS (P4). The IUC programme delivered ten PhD degrees, of which eight are working in ESPOL with fixed nominations. Two PhDs left ESPOL after having obtained their degree and four scholarships were cancelled (and repaid). Seven candidates are still working on their thesis and are expected to obtain their degrees during this year. The ESPOL rector promised to offer all of them a fixed nomination. At this moment 20% of all ESPOL PhD holders have been delivered in the framework of the VLIR/IUC cooperation (10:50) (refer to annex 5 with information on the first and second phase scholarships).

6.3 Efficiency

A lot has been accomplished with the IUC budget which amounted to EUR 6,776,000 for the ten year period (refer to annex 3). The VLIR funding functioned as 'seed money' which attracted considerable co-financing by ESPOL itself and external funding from organisations such as SENPLADES, SENACYT, Ministries of Agriculture and Industries and external donors. The presence of the 'Belgians', be it in person or through their funding, gave importance to the activities of the centres and attracted interest by others, students, staff and donors.

In order to evaluate the relative efficiency of the cooperation programme, a comparison should be made with other IUC programmes on the basis of the external evaluation reports. However this is not part of this evaluation's scope.

The fact that the input of the Flemish experts is not directly paid for, definitely has a positive impact on the efficiency of the programme. However, it must not be forgotten, that this input is paid somewhere, in this case, probably by the Belgian Ministry of Education 'at the cost' of the Belgian students. Some people, most Ecuadorians, indicated that they would have preferred more incentives for the Flemish counterparts because this would have increased their involvement and physical presence in ESPOL. On the other hand, we must conclude that the relative distance of the Flemish counterparts, definitely has a positive effect on the Ecuadorian ownership of the programme. Finally, the 'voluntary' character of the Flemish input might also act as a kind of selection mechanism, through which only highly motivated Belgian experts collaborate, making this a real 'partnership' programme.

The Ecuadorian programme team took advantage of the preparations for the second phase to broaden the cooperation fields and give opportunity to other research groups to join the cooperation programme. ESPOL organised an open call and 48 proposals were submitted. Of these, three were selected by the joint steering committee, giving way to the motto for the second phase: 'more with less'. The fact, that not only the five original components but also the three 'young ones' were rather successful is a clear sign of the efficiency of the cooperation programme.

A subject for polemics is the dichotomy 'sandwich' PhDs or full time PhDs. Official VLIR policy indicates that all PhD trajectories should be on a sandwich basis. This is certainly endorsed by the Ecuadorian project coordinators and directors of the research centres who stress the importance of maintaining strong links between the PhD researchers and the rest of the team and avoiding that the PhD candidate gets alienated from the centre's research priorities. The PhD supervisors in general prefer more time in Belgium to enable

the candidate to concentrate on the research and/or the writing. It is common experience that the candidates get overloaded with other (teaching and administrative) tasks during the periods in Ecuador and suffer delays. The candidates themselves are less uniform in their views and stress the importance of the research subject, for example field work that has to be done in Ecuador or, on the contrary, laboratory experiments that can better be done in Belgium. Furthermore, the family situation of the candidate is very important: single researchers can easily stay in Belgium for longer periods or even for the complete duration of their trajectory, whereas researchers with a family have a really hard time (emotionally and financially) leaving behind their relatives. By way of a conclusion we can state that in principle the sandwich PhD suits best the objectives of strengthening the partner institution by assuring a strong link with the ESPOL research group and with research subjects that are relevant for Ecuador. It also avoids the often mentioned 'technology gap', when PhDs return to their home labs and are not able to apply everything they learned, because the lab does not count with the same technical standards as they were used to in Belgium. However the sandwich model should be applied flexibly (as in fact is being done), making possible longer or shorter stays in Belgium, depending on the requirements of the individual case. The sandwich PhD requires also discipline from the part of the candidate who should not loose him or herself with all kinds of activities at the home university, which for that matter must free the candidates from all other duties. Another aspect which in the case of the ESPOL-IUC has shown to have enhanced the efficiency of the PhD trajectories, was inserting a pre-doctorate training.

6.4 Impact

Although this was not an impact evaluation as such and it might still be early to speak of impact, we found a strong potential for impact at three levels: impact at the private sector, impact at national policies and impact at society.

At the private sector we found that the IUC cooperation is geared towards relevant sectors for Ecuadorian economy, such as biotechnology, water management, mining, aquaculture, bananas, etc. and transfer of knowledge and application of research results is already taking place (P3, P5).

Impact at public policies is less obvious, but in some cases certainly takes place (P4). In addition we may add that having two ministers and one state secretary in the national government indirectly will influence national policies.

The impact at society definitely augmented during the second phase. The pilot project strengthening ICT capacity at primary and secondary schools in the Peninsula Santa Elena was adopted by the Ministry for Education and is now being applied on a larger scale in two other provinces (P2). Some components had their spin-off towards other Ecuadorian universities, for example the assessment towards the Marine Biology career of the University of Santa Elena (P5) or the initiative of P2 to organize various universities to negotiate cheap and good quality access to broad band internet, starting with 13 and now comprising 23 Ecuadorian universities. P6 and P7 provided assessment towards a small community in their struggle to achieve a formal concession for the exploitation of a communal zeolith mine, against competition from a commercial mining company. When cooperating with the private sector there is specific attention towards small-scale producers (P3), although remarks have been heard that this could be intensified.

In conclusion we may state that the programme definitely contributed towards the overall objective of 'empowering ESPOL to better fulfil its role as a development actor in society'.

6.5 Development relevance

First of all we would like to stress the demand oriented way the themes for the IUC cooperation were selected by enthusiastic ESPOL staff, without interference of the Belgian partners. The Ecuadorian initiators were also quite specific about the Belgian expertise they wanted to work with. However it should be mentioned that inside ESPOL selection of subjects for cooperation was subject to individual characteristics like enthusiasm and initiative and not so much based on strategic institutional priorities. Engineering

careers were underrepresented probably because of their relative lack of interest in research.

We consider all subjects relevant for Ecuador, as has been demonstrated above under 'Impact' and in the evaluations of the individual components. In the discussions there were sometimes controversies on what would be more relevant for Ecuadorian development: doing fundamental research versus its applicability for Ecuadorian development; producing international peer reviewed publications, or rather contributing towards national politics (for example as a State Secretary); working with small-scale producers or trying to impact large enterprises; working with small, marginalized universities or rather strengthen what already has potential. These are difficult choices and there is not always a clear answer. As the VLIR-UOS president pointed out during the evaluation's debriefing, even the three primary tasks of a university, research, education and extension can come into conflict and compete amongst each other for time and funding. It is therefore important, but at the same time a challenge, to achieve a proper balance between all these dimensions.

As to the choice of the partner university and the question whether it is more effective to strengthen what already has potential instead of channelling cooperation towards the most needy institutions, our conclusion is that this depends in the first place on the instrument that will be used. The IUC programme aims at strengthening research, implies long-term cooperation and involves Belgian expertise on a more or less voluntary basis. We are convinced that this model works best where there is already some potential, in order to keep both parties interested and motivated and to get the most out of it.

This is not to say that 'poorer' universities should be excluded from VLIR collaboration. The ESPOL experience shows that there are alternatives. First of all, ESPOL has set up a network of collaboration between universities within Ecuador (the Universidad de Cuenca is one of them) thus creating a type of spin off in national collaboration. Second, VLIR sponsored universities in different countries that can start to work together (through different types of North-South-South agreements).

At the VLIR-UOS bureau it was suggested that ESPOL nowadays would not qualify as a partner institution. However, applying the VLIR-UOS criteria on ESPOL we found no ground for disqualification. On the contrary: we think that ESPOL scores very high on what VLIR-UOS considers to be 'the single most important consideration, being the "institutional development potential" of a partner university' (VLIR-UOS folder 2009)⁴. ESPOL is sometimes considered an elitist institution. Although various actors stated that a majority of ESPOL students come from low income families, we found that more than 80% of ESPOL's freshmen come from private colleges and that their parents frequently had also received university education (63% in the case of the mothers and 67% in the case of the fathers) (*Perfil del bachiller*, 2009). This does point towards an elitist university. Selection of new applicants is done only on quality criteria through entrance examinations. As all public university education is free since 2008, there are no financial impediments for low income students to enter university. However, it is obvious that students who come from families with an academic background and who studied at private colleges have an advantage in the entrance exams compared to students who come from public colleges. The question remains whether this is to be rejected. As the rector clearly pointed out, the quality of ESPOL graduates is defined in part by the level they have when they enter university. Maybe these are the change agents Ecuador needs. Maybe the most important criterion should be whether an institution is effectively oriented towards development instead of searching for profits. In this sense we think ESPOL fits perfectly in the VLIR-UOS philosophy.

The Belgian Ministry of Foreign Affairs calls for more coherence between the VLIR programmes and the bilateral cooperation programmes. In this sense we found very little coherence. Belgian bilateral

⁴ VLIR-UOS criteria for selection of a partner institution:

- development dynamics including the demonstrated contribution to development processes
- bias for non-capital based provincial universities
- minimum size and capacity
- active engagement in south-south linkages
- VLIR-UOS contribution is budget wise reasonable but meaningful
- ability to direct its own destiny in a coherent manner
- existing collaboration with Flanders
- Southern ownership with sufficient academic content - more than one department and/or discipline to be addressed.

cooperation with Ecuador is concentrated on the sectors health and rural development, and directed towards the North of Ecuador. There was no coordination with other relevant Belgian programmes such as BIO (Belgian Investments Overseas) nor with Belgian NGO's and very little with BTC (only scholarship funding for the MSc in Marine aquaculture and individual scholarships). On the other hand, the head of the Development Cooperation Office in Quito stressed the fact that VLIR-UOS/ESPOL cooperation aligns with national priorities as the Ecuadorian government explicitly expressed their interest in diversification of production in order to relieve dependency on oil income through the development of technology sectors and through academic cooperation. This year the Belgian cooperation will reconsider its cooperation strategy with Ecuador and cooperation partners, amongst which ESPOL, are explicitly invited to participate in the discussion about the future programme.

6.6 Sustainability

We found some very positive factors for sustainability: Almost all PhD Fellows have been reintegrated and received a position as full professor. In addition the ESPOL rector expressed his commitment also to absorb the remaining seven candidates who are still studying. In fact he indicated his wish to integrate immediately 50 PhD holders, if they were available.

National and international evaluations rank ESPOL among the top Ecuadorian universities and within the first 50 at regional (Latin American) level. There are good institutional arrangements: the 2008-2012 strategic plan, the 2010-2020 research priority plan, the plan for the development of the PARCON knowledge park and the Human Resources Development Plan which envisages training and nomination of 65 extra PhD holders. However, the success of these plans depends on their implementation, and the government funding for the PARCON and doctoral development plans was still under consideration during the evaluation mission.

Almost in contradiction with the ambitious infrastructure and doctoral development plans, we found that some centres have a weak staff base in terms of labour conditions: temporary contracts and low salaries, which affected staff stability during the project implementation. Although ESPOL salaries are said to be relatively high and competitive with the private sector, we found that this only goes for some staff members. Various project coordinators mentioned serious problems they have had trying to retain their staff (P3, P5, P6), competing with salaries in the private sector.

In terms of opportunities, we found that the new Higher Education policy is positive for ESPOL as it gives priority to excellence and makes funds available for those institutions who distinguish themselves in terms of quality and initiative.

Other opportunities are presented by the VLIR-UOS Research Initiative Programme (RIP) and the agreement between FWO and SENPLADES. RIP funds are available for IUC partners (departments or research units) having substantially benefitted from the IUC programme in Phase II. The aim of the RIP funding is to enhance the impact and sustainability of the IUC programme results and partnership at both project and programme level. Maximum three RIPs may be submitted per IUC partnership, per year. Two of the three RIP proposals for 2010 were approved by VLIR (P2 and P6).

The Flemish Research Fund FWO (Fonds voor Wetenschappelijk Onderzoek Vlaanderen) signed an agreement in 2010 with SENACYT for funding of joint research projects between researchers or research teams from Flanders and Ecuador. Although the programme is open for all Ecuadorian universities, ESPOL obviously will be able to take advantage of its established relations with Flemish researchers and research institutes.

6.7 Evaluation of the management of the programme

All persons interviewed (Flemish and Ecuadorian coordinators, VLIR-UOS staff and DGOS officials) commented positively on the way the IUC programme was managed at ESPOL.

In financial terms, the programme has been managed with full transparency. One of the components (P2) developed an on-line information system which made it possible to consult on-line at any moment the status of project expenses in relation to the approved budget. It also facilitated expenditures: once activities were approved in the budget, the project coordinators could quickly access to the necessary funding. The on-line management facilitated also fluid interaction with the Flemish counterparts. Programme management by Ghent University was also commented upon positively by all involved.

Within ESPOL, management depended mostly on the CICYT for rapid approval. Monthly reunions between all participants facilitated this process and at the same time stimulated interaction between the components and facilitated discussions on contents, not only management issues.

6.8 The added value of the IUC programme in comparison to other donor funded cooperation programmes

Unfortunately, the evaluation commission had no useful information on the nature and dimensions of the external cooperation programmes of ESPOL in order to compare these with the VLIR-IUC programme. The website of the International Office of ESPOL mentions many agreements with especially European (Spanish, Flemish, German and Austrian) and United States Universities. However, on the basis of this information it was not possible to make neither a qualitative nor a financial comparison.

ESPOL staff stressed in all interviews the importance of the IUC programme for the development of ESPOL and specially a research culture. It is mentioned as a unique programme in terms of its long term commitment. In the ESPOL Strategic Plan 2008-2012, as part of the analysis of the actual situation, VLIR-UOS is mentioned as the only donor cooperation programme, for its 'impact on Research, on the training of Doctors and Masters, because of its creation and development of the Centre for Information Technologies (CTI), the Centre for Biotechnological Research in Ecuador (CIBE), the training of human resources at postgraduate level, especially the International MSc in Marine Aquaculture and because of the creation of the Interactive Science Museum'.

In our view, the IUC programme is unique because of the long term commitment, the coherent approach at decentralised level, combined with support at central level (CICYT), the systematic organisation and procedures but at the same time relative flexibility, the use of competitive funds in order to promote excellence and cooperation between the programme components, the demand orientation and the promotion of Southern ownership.

On the negative side, there are some aspects of the VLIR-IUC programme that may deserve improvements, for example the influence of internal competition and institutional envy between the Flemish universities on the selection of the counterpart university in the South as well as on the selection of the cooperation partners in Belgium. These are factors that marked the beginning of the cooperation, when Ghent University proposed an IUC programme with ESPOL and Leuven University proposed Cuenca University as IUC partner. Later on in the process, when ESPOL was selected with Ghent University as coordinating Flemish counterpart, it was not always possible to select a specific Flemish coordinator because of his role in other IUC programmes or because of the desired balance between Ghent coordinators and other Flemish universities. It seems that by now these rules are not applied as strictly as before.

Although more prominent participation of Flemish experts could have enhanced quality and effectiveness of the cooperation, their limited participation certainly enhanced ownership at the Ecuadorian side.

In financial terms, the VLIR contribution to ESPOL has been modest. In 2008, ESPOL had a total income of US\$ 71 million, while the contribution of the VLIR was around US\$ 464.460 (of course in 2008, VLIR funding had already decreased to 50% of the annual contributions the programme received from 1999-2005). However, in comparison with other donor funding VLIR contribution is substantial, especially if we consider that the payment of Flemish expertise is not included in the VLIR budget (but paid by their own departments). In addition, most of ESPOL's income goes directly to payroll. Thus, VLIR funding represented a marginal part, but has been crucial to trigger off research projects and additional funding.

7. Conclusions and recommendations

7.1 Conclusions

Strengths of the IUC programme at ESPOL

Effectiveness:

- The VLIR-IUC programme from the start aimed at strengthening research capacity in a low income country of Latin America. At the start of the collaboration, research and postgraduate education was nearly inexistent in Ecuador and ESPOL. Against that background, a main achievement was that a research culture was born, and that research policies and management systems have been developed and implemented.

Relevance:

- The relevance of the research areas of the centres supported by IUC is certainly an important strength of the IUC programme. All centres, though in different degrees, are dedicated to relevant and applied research activities and service delivery.
- Selection of cooperation topics has been demand oriented. All projects started from existing demands from within ESPOL after which appropriate Flemish counterpart expertise was searched.

Management:

- The development of projects was strictly planned from the beginning (though allowing for flexibility and adjustments). It is important to stress that the collaboration started with a first planning stage on part of ESPOL. Related to the previous point, individuals or groups of researchers were invited to participate, and the ones who chose to do so elaborated a long term vision of what they wanted to do.
- Management of funds was transparent and swift. An innovative information system was set up. ESPOL, through CTI (P2) developed its own on-line information and management system. This allowed all participants to know how much money was spent on what, and facilitated payments. Patents pending, all VLIR projects could use this system. Notwithstanding the usual bureaucratic red tape, the use of VLIR funding by ESPOL has been very transparent.
- Monthly meetings between all project leaders proved to be crucial. All coordinators stressed this point not only for very practical solutions to day-to-day problems and as a way to know first-hand what the rest were doing but also to integrate academic research teams and topics.
- The importance of commitment from ESPOL authorities, combined with strong leadership by the respective programme coordinators and a strong, participative team effort.
- An outstanding feature of the VLIR-ESPOL collaboration has been the direct communication between projects and the VLIR, leaving out all possible intermediate levels (directors, deans, etc.).

Approach:

- Cooperation with decentralised research groups was accompanied by strengthening and institutionalising research culture at central level (strengthening CICYT).
- Ownership by Ecuadorians. The prior point leads to a situation in which all project are clearly “owned” by the Ecuadorian counterparts and related to local demands. All projects seem to be able to continue beyond de VLIR-ESPOL collaboration phase. For many, VLIR has served as a crucial point of departure with seed funding
- Prevalence of academic themes over political issues: ESPOL, from 1999 to date has been a very stable organisation. The last strike by academic staff, they told us, dates back to 1979 and lasted a couple of days. This stability stands out in a country that has gone through multiple government changes. In practical terms, this has meant that projects were defined at the light of perceived local demands and by interests of local researchers and that improvement measures are institutionalised and are maintained disregarding political processes.

Weak points of the IUC programme at ESPOL

- By the time of our evaluation, several Ecuadorian students were abroad, and some had just left to study their PhD. In practice, this means that some centres have currently a very small full-time staff, at the same time as they are preparing for the transfer to the PARCON installations, with modern laboratories.
- Only persons with a PhD qualify for full time professor, and are not always easy to find. The stipulation by ESPOL that only those holding a PhD degree qualify for a full time, tenured job is in itself a good measure (by the same token, the new national law marks the masters degree as a minimum). However, this leaves academics with a *licenciatura* or masters degree in a difficult position: while full professors earn competitive wages, the rest of academic staff work for low wages, making a move to the private sector sometimes more attractive. In practice this means that some centres are almost fully dependent on two or three full time academic staff, while the rest of academics work on a semi permanent basis until they find an option to do postgraduate studies (and a grant to do so). At the same time, scientific postgraduate programmes are scarce in Ecuador. Some thoughts should be given to academic career possibilities, possibly with a system of full professors and associate or adjunct staff.
- Salaries in the private sector may turn out to be more attractive. Salaries for full time, tenured academic staff at ESPOL are among the best in Ecuador and can compete with the private sector. Less positive however is the situation for the rest of academic staff: they work for low salaries, and on yearly contracts. For them, the private sector may turn out to be more attractive.
- The Research Council is weak, with little influence on decisions. The Research Council started out as a small club, headed by the rector. This was logical at the time when research was only a marginal activity at ESPOL. By now, however, ESPOL should think about a broader representation and a more formal organization.
- There has been a weak development of postgraduate programmes. By 1999, postgraduate education (at ESPOL and in Ecuador) was practically inexistent. For several reasons, the theme was not considered within the VLIR- ESPOL collaboration. After ten years, however, ESPOL lacks good postgraduate courses. This means in practice that the future development of staff remains almost completely dependent on scholarships to study abroad, from the masters level on. In our opinion, ESPOL has by now the means and the opportunities to set up several masters programmes in the short term.

Some thoughts on the selection of the partner university

- At the level of the IUC programme there is confusion on the type of institution that should be selected for IUC cooperation. On the one hand, the mandates for international development collaboration call for working together with the poorest countries and universities, as they need the outside help most. On the other hand, the inter-university collaboration, according to VLIR terms (which reflect the interests of Flemish universities) aims at creating internationally competitive research centres. The gap between the two objectives can be very big.

We think that a useful lesson from the collaboration with ESPOL is that it is fruitful working with institutions that have an 'intermediate' level of development. Based on the ESPOL experience, this would mean an institution with at least a clear commitment to develop future research (creating conditions and hiring academic staff), and a relatively stable financial and political situation. Additionally, the university would need a development plan and a team to support collaboration.

7.2 Recommendations

Recommendations to ESPOL

- Integrate all (forthcoming) PhD candidates. This has been done in nearly all the cases (we found only one exception). The future of ESPOL and PARCON will depend on having a crucial mass of PhDs and auxiliary personnel.
- Fixed and attractive appointments for other academic staff. Several centres still depend on a small group of full time, tenured professors with a PhD, surrounded by a larger group of people with only an undergraduate degree, receiving low wages and having no tenure. In some cases, this makes the future of projects highly dependent on two or three persons. Our suggestion would be to introduce an academic professional career plan, which includes positions such as associate professors (with an MSc degree) and research assistants (postgraduate students). In this way, all centres would count with sufficient human resources.
- We recommend that ESPOL fully implements its research strategy, related to the PARCON plan and the *Plan de Capacitación Doctoral*. Some remarks were made that the plan seemed farfetched and close to daydreaming, but it is strongly motivating the academic community and ESPOL has successfully implemented other seemingly far-fetched plans in the past. However, it will require the incorporation of several additional researchers (and substantial extra funding).
- Strengthen the Research Council. The council started out as a small group when research was weak. Now that research has become a central activity, participation should be broadened, the role of the council should become more formalized and its relation with CICYT clarified. A specific recommendation is to maintain and formalise the practice of monthly meetings, which were triggered off by the VLIR collaboration. An important strength of ESPOL has been the constant collaboration and communication between research groups.
- Stimulate researchers to write down research results, preferably for international peer reviewed journals.
- Strengthen outreach towards communities. Collaboration with outside parties has been traditionally troublesome in Latin America. However, ESPOL has several interesting collaborations, and could develop even more,
- We certainly think ESPOL should strengthen postgraduate education. This was not an objective at the start of the VLIR-ESPOL collaboration. However, ten years later, it seems obvious that ESPOL can and needs to develop masters and PhD programmes in order to guarantee its future development.

Recommendations to the centres

- Strengthen outreach towards communities. Most projects have already done so, but still have several additional opportunities to improve impact in local communities.
- Strengthen transdisciplinary focus. This is a more complex issue: ESPOL has, for historical reasons, been focused on engineering. Some projects however will require expertise from other fields of study (Law, Medicine, Sociology, and Economics) to fully develop.
- Maintain and expand interaction and collaboration between centres. Collaboration has been a crucial strength and should be maintained.
- Make a real effort to write down research results and publish in international refereed journals.
- Developing and implementing strategic research plans including Human Resource Development. Planning has been the formula for success in the collaboration with VLIR. It will be even more crucial in the move to the PARCON. Obtaining (external) funding is a precondition, but the consolidation of the several research centres will most of all require a careful planning of human resources.

- Strengthen post-graduate teaching. A weakness we encountered in all projects was the absence of post-graduate courses. This in practice means that the future of the centres remains highly dependent on sending staff abroad (which implies high costs, and the absence of crucial academic staff during years). We consider that ESPOL is now in a position (considering existent staff and resources) to open several masters' programmes and perhaps some PhDs.

Recommendations to Belgian partners

- Maintain academic cooperation with ESPOL. Collaboration with ESPOL has been highly successful and should be continued. Several interesting projects are already in the making. All individual programme components deserve continuation (with e.g. RIP funding) but cooperation could also be broadened towards new topics.
- Expand towards other subjects and include other institutions (North and South). After many years of VLIR support to many universities in the South, there are many opportunities to establish networks between Flemish universities and several universities in the South. Some interesting proposals already exist.
- Facilitate South South (South) cooperation. In establishing new collaborations in the South, Belgian universities and/or research groups should invoke the help of previous partners. An interesting example is the agreement between ESPOL, Universidad de Cuenca, Can Tho University (Vietnam), Ghent University and Leuven University.

Recommendations to VLIR

- Careful selection of partner universities. This would mean selecting an institution with at least a clear commitment to develop future research (creating conditions and hiring academic staff), and a relatively stable financial and political situation. Additionally, the university would need a development plan and a stable team to support collaboration.
- In order to include 'poorer' universities in VLIR collaboration, the IUC programme should imply an explicit strategy of working towards weaker institutions in the same region through networking, thus creating a type of spin off in international collaboration (through different types of North-South-South agreements).
- Keep competition and institutional envy between the Flemish universities out of inter-institutional cooperation programmes in the South.
- IUC programme could pay more explicit attention to the integration of research with (post-graduate) education.
- The ten year life span of projects is fairly unique in the world and needs to be maintained in IUC programme design. According to our evaluation, the least developed projects are those who entered in the second phase. For various reasons, projects need a ten year maturation time: doctorate education requires often six to seven years (or more if the host university lacks professors with a master's degree), contacts with outside stakeholders need their time, laboratories need to be equipped not only with instruments, but also with people able to manage them. We thus strongly recommend VLIR to maintain its ten year collaboration programme, including an intermediate evaluation.
- Maintain competitive elements in IUC programme. Competition for outside funding produces various desirable effects: in ESPOL's case it leads to the creation of new teams and projects, to a greater ownership of projects, and to increasing abilities of several researchers to write projects and to present them for outside funding
- Now that various IUC programmes have been finalised and externally evaluated, a meta-evaluation should be called for, in order to obtain information on decisive factors for success, effectiveness and sustainability in order to guide future calls.

- For future external evaluations, we recommend that there be some, but not a complete overlap between the visit of the Flemish partners and the external evaluation, in order to avoid too much pressure on the Southern institution as well as on the evaluators' agenda. Arrival of the Flemish delegation (and start of the closure conference) towards the end of the evaluation would be more opportune.
- For future evaluations we recommend that VLIR-UOS at the start of the commission give the evaluators access to the internet-based data base with detailed information on the IUC programme and its components. It would also be opportune to have consolidated financial information at project level with expenditures per budget line.

Annex 1 Programme of the visit and persons attending

Monday, 7 December 2009, Brussels

10u15 – 11u15	Prof. Liliane Schoofs	KULeuven, P5
11u30 – 12u30	Prof. Serge Hoste	UGent, P1
13u30 – 14u30	Prof. Leo Van Biesen	Vrije Universiteit Brussel, P4
14u45 – 15u45	Prof. Jan Elsen	KULeuven, P6
16u00 – 17u00	Prof. Dirk Deschoolmeester	UGent, P7
17u15 – 18u00	Prof. Guido Dedene (telephone)	KULeuven, P8

Tuesday, 8 December 2009, Brussels

9u30 – 10u30	Prof. Rony Swennen	KULeuven, P3
10u45 – 11u45	Prof. Magda Vincx	UGent Flemish Programme Coordinator
12u00 – 13u00	Christophe Goossen, Peter de Lannoy, Kristien Verbrugghen	VLIR-UOS Bureau
14u00 – 15u00	Dirk Molderez, Anne van Malderghem	Ministry of Foreign Affairs, DGOS
15u15 – 16u15	Prof. Ronald Soetaert	UGent, P2

Wednesday, 13 January 2010

Arrival in Quito

Thursday 14 January 2010

Time	Activity	Participants
9:00	Ministry of Agriculture (MAGAP)	Ramon Espinel, Minister
10:00	Meeting at Belgian Embassy	Stefan Meersschaert, Head of Cooperation Office
14:00	Ministry of Industries	Hugo Jimenez, Project Manager Technical Innovation Plan
16:00	National Secretary for Science and Technology SENACYT	Diego Cueva, Director of Innovation
17:00	National Council for Evaluation and Accreditation CONEA	Arturo Villavicencio, President

Friday, 15 January 2010

<i>Time</i>	<i>Activity</i>	<i>Participants</i>
	Travel from Quito to Guayaquil	
11:00	ESPOL, CICYT	Sergio Flores, local coordinator ESPOL-VLIR/IUC programme
14:00	CICYT	Jorge Calderón, Project Coordinator P1, Director CICYT
16:00	CIBE	Esther Peralta, Project Coordinator P4, director CIBE

Saturday, 16 January 2010

<i>Time</i>	<i>Activity</i>	<i>Participants</i>
9:30	Visit to 'San Humberto'	Simon Cañarte, Banana producer
13:30	Visit to 'OMARSA'	Julie Nieto, Director Quality Assurance

Sunday, 17 January 2010

<i>Time</i>	<i>Activity</i>	<i>Participants</i>
8:00	Travel to Puerto López	Flemish delegation, external evaluators, ESPOL/IUC programme coordinator

Monday, 18 January 2010

<i>Time</i>	<i>Activity</i>	<i>Participants</i>
8:30	Visit to CENAIM	Bonny Bayot, Project Coordinator P5 María Herminia Cornejo
12:00	Return to Guayaquil	
14:30	CADS	María del Pilar Cornejo, Project Coordinator P4, National Secretary Risk Management David Matamoros, Director ad interim CADS Gina Andrade Indira Nolivos
20:00	Banker's club	Welcome dinner

Tuesday, 19 January 2010

<i>Time</i>	<i>Activity</i>	<i>Participants</i>
8:00	ESPAE, Campus Las Peñas	Virginia Lasio, Project Coordinator P7, Directora ESPAE Denisse Rodríguez, Head EJE Edgar Izquierdo, Head CEEMP Jorge Cárdenas, PhD scholarship holder Juan Fernando Tinoco, Research Assistant

<i>Time</i>	<i>Activity</i>	<i>Participants</i>
		Francisco Parra, Research Assistant Andrea Samaniego, Research Assistant
10:00	ICQA	Fernando Morante, Researcher Mauricio Cornejo, Director de Calidad LEMAT, PhD candidate Paul Carrión, professor Facultad de Ingeniería de Ciencias de la Tierra, former director CICYT, former coordinator P1 Cecilia Paredes, Project Coordinator P6, Director LEMAT
14:00	CICYT	Meeting with scholarship holders
16:00	FIEC	Cristina Abad, Project Coordinator P8

Wednesday, 20 January 2010

<i>Time</i>	<i>Activity</i>	<i>Participants</i>
8:00	CTT	Responsible for VLIR payments
9:00	Rectorate	Moisés Tacle, Rector
10:00	CTI	Enrique Pelaez, Project Coordinator P2, Director CTI
12:00	Visit to Robotics Lab CVR	Daniel Ochoa, PhD candidate
	Report writing	

Thursday, 21 January 2010

<i>Time</i>	<i>Activity</i>	<i>Participants</i>
	Report writing	
15:00	CICYT: Debriefing Evaluation Committee	Joint Steering Committee, ESPOL and Flemish project coordinators
20:00		Closing dinner

Friday, 22 January 2010

Departure from Guayaquil

Friday, 29 January 2010

Conference call with Dr Esther Peralta, director general CIBE

Sunday, 7 February 2010

Conference call with Prof. Patrick Sorgeloos, President VLIR-UOS

Annex 2 References

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s.f.	CENAIM-ESPOL	Maestría en Ciencias Acuicultura Marina
s.f.	CENAIM-ESPOL	Congreso Ecuatoriano de Acuicultura; Congreso Latinoamericanos de Acuicultura y Exposición: Estrategias de una nueva industria
2001	CENAIM-ESPOL	El mundo acuícola. "Apoyando a la Industria y a la Educación"
2001-2002	CENAIM-ESPOL	Revista CONESUP El estado de la educación superior en el Ecuador 2004-2005, N° 2, año 2005, CONESUP: Quito
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2008	ESPOL	Plan estratégico ESPOL 2008-2012
2009	ESPOL	Proyecto de Acreditación ABET-ESPOL, Perfil del Bachiller que ingresa a Ingeniería en la ESPOL en mayo de 2009
2008	ESPOL/CTI	Estadísticas ESPOL periodo lectivo 2008-2009
2008	ESPOL/ESPAE	CEEMP Final VLIR report
2008	ESPOL/ESPAE	Project VLIR-ESPOL. Entrepreneurs Development Program. Junior Enterprise Evolution
2009	ESPOL/ESPAE	Global Entrepreneurship Monitor Ecuador 2008
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diciembre	ESPOL	
2002	Frits Wils, Patrick de Sutter	Final Report External Mid-term Evaluation of the Institutional University Cooperation with the Escuela Superior Politécnica del Litoral, Ecuador
2009,	Investigación & Desarrollo	Edición Especial: Prioridades de investigación de la ESPOL 2010 – 2020; El Parque del Conocimiento
diciembre		Secretaría Nacional de Ciencia y Tecnología, Indicadores de Actividades Científicas y Tecnológicas Ecuador 2009
2009	SENACYT	
2003	VLIR-ESPOL Programme	IUC Partner Programme Phase II 2003 - 2008
2005	VLIR-ESPOL Programme	Annual Progress report 2004
2006	VLIR-ESPOL Programme	Annual Progress report 2005
2007	VLIR-ESPOL Programme	Annual Progress report 2006
2008	VLIR-ESPOL Programme	Annual Progress report 2007
2009	VLIR-ESPOL Programme	Annual Progress report 2008
2009	VLIR-ESPOL Programme	Lessons learned in the VLIR-ESPOL international cooperation program
2008	VLIR-UOS	A portrait in chiaroscuro: Ten years of collaboration between the Universidad Mayor de San Simón and VLIR-UOS
2008	VLIR-UOS	Final evaluation of the IUC partner programme

2008	VLIR-UOS	with the Can Tho University (CTU), Vietnam Final evaluation of the IUC partner programme with Hanoi University of Technology (HUT), Vietnam
2009	VLIR-UOS	Final evaluation of the IUC partner programme with the University of Zimbabwe (UZ)
2009	VLIR-UOS	Final evaluation of the IUC partner programme with the University of Nairobi (UoN), Kenya
2009	VLIR-UOS	Information leaflet on the Institutional University Cooperation (IUC)

Annex 3 Programme components and objectives

PROJECT TITLE	Overall Objectives	Specific Objectives
Enhancement of Research Capabilities (P1)	ESPOL is an institution with a high level of culture for scientific research • The capacity of ESPOL, to generate relevant scientific research in areas of socio-economical and technological importance is enhanced. (overall academic)	CICYT (Centre for Scientific and Technological Research) is a strong operational stimulator of research activities in ESPOL for international fund raising awareness, and coordinates research activities at ESPOL, it also stimulates development of innovative methods of training student and professors to enhance research abilities. (specific academic)
Education innovation in Engineering through Information Technology (P2)	The institutional capacity of ESPOL, to generate relevant research based knowledge and services in strategic areas of national development, and provide innovative quality training, is enhanced. (overall academic) In Ecuador, ICT is being effectively and widely utilized to enhance learning processes and environments. (overall development)	In Ecuador, ESPOL is the leading Institution in terms of integration and use of ICT in learning processes & environments to enhance cognitive and collaborative skills, and is a national and internationally recognized Centre for multimedia development and training. (specific academic)
Musa spp. Biotechnology for a sustainable, environmental and social development of Ecuadorian agriculture (P3)	Biotechnology capacity created for sustainable, environmental and social development for Ecuador (overall development)	To reinforce the Biotechnology research in ESPOL (specific academic) To publish the advances and results of the research projects in national and international journals (specific academic) To develop the research projects of technological innovation (specific academic) To get national and international recognition as research and training centre (specific academic) To execute joint projects with the producing sector (specific academic) To maintain and to improve the ISO 9001:2000 Certification for research (specific academic)
Environmental Management Systems in Agriculture and Aquaculture (P4)	The use of Environmental Management Systems and Tools has contributed to the decline of environmental degradation and to the progress towards sustainability of the Ecuadorian Coastal Region. (overall development) The institutional capacity of ESPOL to generate relevant research based knowledge and services in environmental management and policy is enhanced (overall academic)	Through the development and subsequent promotion of environmental management tools, ESPOL is meeting the international standards for recognition as a Reference Centre to support Environmental Assessment and Decision-Making in Ecuador (specific development)
Management Techniques for a Sustainable Aquaculture (P5)	The institutional capacity of ESPOL to generate relevant research based knowledge and services in strategic areas of national development and provide innovative quality	To stimulate multidisciplinary scientific interactions among the Centre of Aquaculture of the Faculty of Marine Sciences and the Faculty of Engineering of ESPOL in order to consolidate research in both institutes (specific academic)

	<p>training is enhanced, as well as create a local capacity to compete for national and international financing or funding or research projects.</p> <p>The research basis to enhance the sustainability and productivity of the shrimp production sector is strengthened.</p>	To increase human capacity of ESPOL through PhD programs (specific academic)
Applications research of non-metallic materials (P6)	<p>Teaching and research capacity on non-metallic materials at ESPOL is improved. (overall academic)</p> <p>The utilization of research in non-metallic materials Increases the sustainability of the Ecuadorian Coastal Region and has contributed to the improvement of productivity and quality of life in the region. (overall development)</p>	<p>ESPOL drives and supports research and development of non-metallic materials through the design and execution of projects applied to the social development of PSE; furthermore, it offers to the productive sector analysis, diagnostic and certification of non-metallic materials through the laboratories involved in the materials program. (specific development)</p>
Entrepreneurship Development Program (P7)	<p>Ecuadorean companies improve their competitiveness (overall development)</p> <p>The institutional capacity of ESPOL to generate relevant research based knowledge and services in strategic areas of national development, and provide innovative quality training is enhanced. . Leadership and local reference in entrepreneurship is attained. (overall academic)</p>	<p>ESPOL develops its own educational model in entrepreneurship, thus entrepreneurial skills and orientation of the faculty and graduates of ESPOL has been enhanced significantly (specific academic)</p>
Education & Research Capabilities Development Program for: Software Engineering, Telecommunications and Robotics (P8)	<p>The research, education, product and service development capabilities of the Electrical and Computer Engineering Department at ESPOL are strengthened. (overall academic)</p>	<p>The Computer Engineering program at ESPOL is improved and the conditions for developing research in order to introduce high quality standards into the Ecuadorian Software Industry are established at ESPOL. (specific academic)</p>

Annex 4 Expenditures IUC ESPOL 1999 - 2008

Budget in €	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
B. Investment costs	€ 403.679,21	€ 218.675,60	€ 159.127,41	€ 154.504,40	€ 175.162,54	€ 107.934,72	€ 94.299,86	€ 58.339,56	€ 74.118,03	€ 5.734,00	€ 1.451.575,33
C. Operational costs	€ 214.200,43	€ 244.383,65	€ 398.957,55	€ 374.344,46	€ 301.405,68	€ 291.626,92	€ 273.735,84	€ 217.633,96	€ 278.599,79	€ 215.430,00	€ 2.810.318,28
D. Personnel costs	€ 46.100,91	€ 103.219,10	€ 2.173,97	€ 1.970,52	€ 5.050,46	€ 1.877,70	€ 62.353,29	€ 96.171,32	€ 19.447,60	€ 10.000,00	€ 348.364,87
E. Scholarship costs	€ 7.628,63	€ 54.986,68	€ 79.517,73	€ 112.958,53	€ 123.091,29	€ 177.791,03	€ 186.318,47	€ 146.516,61	€ 100.701,88	€ 51.037,00	€ 1.040.547,85
F. International travel costs	€ 17.403,86	€ 46.313,33	€ 38.537,07	€ 28.689,70	€ 41.282,75	€ 38.980,28	€ 35.313,04	€ 39.558,99	€ 24.076,57	€ 24.000,00	€ 334.155,59
G. Board and lodging costs	€ 11.168,32	€ 33.900,08	€ 19.508,51	€ 22.257,35	€ 33.842,59	€ 30.932,58	€ 29.534,76	€ 25.049,11	€ 17.739,08	€ 19.086,00	€ 243.018,38
H. Shipment costs	€ 69,41	€ 6.779,17	€ 784,08	€ 5.917,90	€ 3.749,60	€ 5.196,68	€ 4.490,31	€ 725,22	€ 152,44	€ 545,00	€ 28.409,81
<i>Subtotal</i>	€ 700.250,77	€ 708.257,61	€ 698.606,32	€ 700.642,86	€ 683.584,91	€ 654.339,91	€ 686.045,57	€ 583.994,77	€ 514.835,39	€ 325.832,00	€ 6.256.390,11
Administration costs											
K.1. Administration costs in Be	€ 35.012,53	€ 35.412,88	€ 34.930,32	€ 35.032,14	€ 34.179,25	€ 32.717,00	€ 34.174,00	€ 19.000,00	€ 17.000,00	€ 15.000,00	€ 292.458,12
K.2. Local administration costs	€ 7.726,62	€ -	€ 28.284,23	€ 34.096,53	€ 26.478,41	€ 20.820,98	€ 24.665,88	€ 32.000,00	€ 27.991,09	€ 25.000,00	€ 227.063,74
TOTAL	€ 742.989,92	€ 743.670,49	€ 761.820,87	€ 769.771,53	€ 744.242,57	€ 707.877,88	€ 744.885,45	€ 634.994,77	€ 559.826,48	€ 365.832,00	€ 6.775.911,96

Annex 5 VLIR-UOS Scholarships during first and second phase

PROYECTO VLIR-ESPOL

FASE I

RESUMEN DE BECARIOS

Componente		Nombre del Becario	Fecha de Inicio de Estudios	Fecha de Fin de Estudios	Tipo de relación	Fecha de inicio de contrato	Unidad Académica	Universidad	Título obtenido o por obtener
Nº	Nombre								
2	Education Innovation in Engineering & Environmental Sciences and Research Enhacement	Katherine Chiluita García	dec/01	nov/04	Profesor con Nombramiento	Junio 14, 1995	FIEC	Universidad de Gent	Doctoral Studies in Educative Sciences
2	Education Innovation in Engineering & Environmental Sciences and Research Enhacement	Xavier Ochoa Chenab	2001	2002	Profesor con Nombramiento	Octubre 21, 2002	FIEC	Universidad Libre de Bruselas	Master in Applied Computer Science
3	Biotechnology for a sustainable, environmental and social development of Ecuadorian agriculture (MUSA)	María Isabel Jiménez Feijoo	1/03/2003	21/12/2007	Profesor con Nombramiento	Diciembre 2008	FIMCP	Universidad Católica de Lovaina	Doctoral studies in Applied Biological Sciences (Effect on the nutritional status in banana (Musa spp) on leaf disease infestation by Mycosphaerella fijiensis in Ecuador)
3	Biotechnology for a sustainable, environmental and social development of Ecuadorian agriculture (MUSA)	Oscar Navarrete Villegas	1/03/2001	2010	Ninguna			Universidad de Gent	Doctoral Studies in Biotechnology (Biosynthesis of Folic Acid in Plants)
3	Biotechnology for a sustainable, environmental and social development of Ecuadorian agriculture (MUSA)	Efrén Santos Ordoñez	1/03/2001	17/04/2008	Profesor con Nombramiento	Mayo 05, 2008	FIMCP	Universidad Católica de Lovaina	Doctoral studies in Applied Biological Sciences (Isolation and characterization of novel banana promoters)
4	Environmental Management Systems in agriculture and aquaculture (EMSAA)	Paúl Herrera Samaniego	1/10/2001	1/06/2005	Profesor con Nombramiento	Noviembre 2007	FIMCP	Universidad de Gent	Doctoral studies in Agricultural and Applied Biological Sciences
4	Environmental Management Systems in agriculture and aquaculture	Verónica Ruiz Xomchuk	1/10/2002	1/09/2003				Universidad de Gent	Master of Science in Marine and Lacustrine Sciences

Pendiente graduación

	(EMSAA)								
4	Environmental Management Systems in agriculture and aquaculture (EMSAA)	Alba Calles Procel	okt/00	sep/01	Profesor con Nombramiento	Julio 01, 2007	FICM	Universidad de Gent	Master of Science in Nematology
4	Environmental Management Systems in agriculture and aquaculture (EMSAA)	Alba Calles Procel	okt/02	okt/07	Profesor con Nombramiento	Julio 01, 2007	FICM	Universidad de Gent	Doctoral studies in Applied Biological Sciences
4	Environmental Management Systems in agriculture and aquaculture (EMSAA)	David Matamoros Camposano	sep/99	29/06/2004	Profesor con Nombramiento		ICQA	Universidad de Gent	Doctoral studies in Applied Biological Sciences
5	Management techniques for sustainable shrimp aquaculture (MATESA)	Ana Gutiérrez Alarcón	4/10/2002	2008	Ninguna			Universidad Católica de Lovaina	Doctoral studies in Applied Biological Sciences
5	Management techniques for sustainable shrimp aquaculture (MATESA)	María de Lourdes Cobo Barcia	2002	2010	Investigadora contratada		CENAIM	Universidad de Gent	Doctoral studies in Applied Biological Sciences
5	Management techniques for sustainable shrimp aquaculture (MATESA)	Xavier Romero	2001	BECA CANCELADA	Ninguna			Universidad Católica de Lovaina	
5	Management techniques for sustainable shrimp aquaculture (MATESA)	César Molina	2001	BECA CANCELADA	Ninguna				
6	Coastal Development Enhancement	Alejandro Chanabá Ruiz	okt/00	sep/01	Profesor con Nombramiento	Octubre 18, 2001	FIMCM	Universidad de Gent	MASTER IN TRANSPORT AND MARITIME MANAGEMENT
6	Coastal Development Enhancement	Paola Gálvez Izquieta	sep/01	dec/04	Ninguna			Universidad Politécnica de Valencia	Master Universitario Internacional en Alta Gestion Hotelera 2001-2002
6	Coastal Development Enhancement	Fernando Mayorga Gualpa	sep/01	dec/04	Profesor Contratado	Octubre 13, 2008	LICTUR	Universidad Politécnica de Valencia	Master Universitario Internacional en Alta Gestion Hotelera 2001-2002

Pendiente graduación

FINAL GRANTS FOR MASTERS STUDENTS: 6

FINAL GRANTS FOR PhD STUDENTS: 9

PROYECTO VLIR-ESPOL

FASE II

RESUMEN DE BECARIOS

Nº	Componente	Nombre del Becario	Fecha de Inicio de Estudios	Fecha de Fin de Estudios	Tipo de relación	Fecha de inicio de contrato	Unidad Académica	Universidad	Título obtenido o por obtener	
	Nombre									
2	Education Innovation in Engineering & Environmental Sciences and Research Enhancement	Xavier Ochoa Chenab	mei/04	sep/08	Profesor con nombramiento	Octubre 21, 2002	FIEC	Universidad Católica de Lovaina	Doctoral Studies in Applied Information Technologies	
3	<i>Biotechnology for a sustainable, environmental and social development of Ecuadorian agriculture (MUSA)</i>	Juan José Aycart Mite	10/10/2004	BECA CANCELADA	Ninguna			Universidad Católica de Lovaina	Doctoral studies in Molecular Biology: Genetic Engineering	
4	Environmental Management Systems in agriculture and aquaculture (EMSAA)	Verónica Ruiz Xomchuk	okt/04	2010	Ninguna			Universidad de Gent	Doctoral studies in Food web structure along Ecuadorian Sandy beaches	Pendiente graduación
4	Environmental Management Systems in agriculture and aquaculture (EMSAA)	Luis Domínguez Granda	1/12/2003	28/11/2007	Profesor con nombramiento	Enero 01, 2008	ICQA	Universidad de Gent	Doctoral studies in Applied Biological Sciences	
4	Environmental Management Systems in agriculture and aquaculture (EMSAA)	Indira Nolivos Alvarez	okt/04	2010	Ninguna			Universidad de Gent	Doctoral Studies Applied in Environmental Management Systems in agriculture and aquaculture	Pendiente graduación
6	Applications Research of non-metallic materials	Miguel González	13/09/2004	jul/06	Ninguna			Universidad Católica de Lovaina	Master in Applied Mineralogy	
6	Applications Research of non-metallic materials	Mauricio Cornejo Martínez	nov/04	2010	Profesor contratado	mei/02	FIMCP (ING. INDUSTRIAL)	Universidad Católica de Lovaina	Doctoral studies in Transformation Processes of Building Materials	Pendiente graduación
7	Entrepreneurship Development Program	María Rodríguez Zurita	6/10/2003	3/07/2004	Profesor con nombramiento	Octubre 01, 2005	FIMCP	Universidad de Gent	Master in Operations and Technology Management	
7	Entrepreneurship Development Program	Lázaro Sumba	6/10/2005	3/07/2005	Profesor contratado	Octubre 2000 a agosto 2008	FEN	Universidad de Gent	Master in Operations and Technology Management	
7	Entrepreneurship Development Program	Edgar Izquierdo Orellana	15/09/2003	19/05/2008	Profesor con nombramiento	Enero 22, 1987	FIEC	Universidad de Gent	Doctoral studies in Applied Economics with Emphasis in Entrepreneurship	

									rship	
7	Entrepreneurship Development Program	Jorge Luis Cárdenas Muga	1/10/2004	2010	Profesor contratado	Mayo 2003 a Octubre 2004	ESPAE/FIMC P	Universidad de Gent	Doctoral studies in Applied Economics with Emphasis in Entrepreneurship	Pendiente graduación Grado por definir en vista del cambio de facultad
8	Education and Research capabilities Development Programme for: Software Engineering, Telecommunications and Robotic	Daniel Ochoa Donoso	17/09/2003	2010	Ninguna			Universidad de Gent	Doctoral studies in Biomedical Image Analysis	Pendiente graduación
8	Education and Research capabilities Development Programme for: Software Engineering, Telecommunications and Robotic	Hernán Córdova Junco	sep/04	BECA CANCELADA	Ninguna			Universidad Libre de Bruselas	Doctoral Studies in Telecommunications	

FINAL GRANTS FOR MASTERS STUDENTS: 3

FINAL GRANTS FOR PhD STUDENTS: 8

VLIR-UOS

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