GLOBAL REPORT ON THE EVALUATION OF THE RESEARCH UNITS ON CIVIL ENGINEERING

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1. Introduction

The co-ordinator of the panel for the evaluation of the university-based Civil Engineering research units was appointed by the President of Fundação para a Ciência e Tecnologia (FCT) in September 2002. The deadline set to close the evaluation was March 2003.

The panel co-ordinator requested permission to implement first the assessment of the ongoing research projects funded by FCT. This request was motivated by the belief that the performance of the research units might have been affected by the instability of the funding policies and procedures during the period under evaluation.

This request was authorized and the process to set up the intermediate assessment of the research projects was launched in October 2002. It was realised later that it would not be possible to assess all projects adequately if the deadline set for the evaluation of the research units was to be met. This process was suspended in December 2002 to initiate the evaluation of the research units reported here.

The first part of this report (Sections 2 to 4) identifies the members of the evaluation panel and the units under evaluation and describes succinctly the procedure of evaluation. The second and third parts of the report address the preliminary evaluation (Sections 5 and 6) and the site evaluation (Sections 7 and 8). The results registered are presented in a global form, defining the minimum, maximum and weighed average marks registered for each of the items under assessment. The third part of the report summarises the global results of the evaluation (Section 9), the recommendations for Special Programmatic Funding (Section 10) and the strengths and weakness of the units, as identified in this evaluation (Section 11). The report closes with the presentation of suggestions and recommendations on policies for the sector (Section 12).

This report is complemented with two sets of appendices. The first set (Appendices I and II) collect recommendations on the structure of the unit reports and on the implementation of the site visits. The second set (Appendices III to XIV) collects the reports of the panel on each of the units under assessment.

Panel members wish to stress that they were favourably impressed with the quality of the administrative and logistic support provided by FCT, particularly in what concerns the commitment and efficiency of all staff members involved in the organisation of the process of evaluation.

2. Evaluation panel

The members of the civil engineering panel are indicated in Table 1. They were all mentioned in a working list of specialists submitted by all units under evaluation already funded by FCT, as requested by the panel co-ordinator.

Table 1: Civil engineering evaluation panel

Evaluator	*Host institution*
E. Alonso	Universitat Politécnica de Catalunya
E. Calderón	Universidade Politécnica de Madrid
G. De Roeck	Katholieke Universiteit Leuven
A. D. Pearman	University of Leeds
R. N. Swamy	University of Sheffield
Y. Zech	Université Catholique de Louvain

They were selected by consultation of Portuguese and foreign specialists in the different areas of research in Civil Engineering, meeting the profile established by FCT, namely foreign specialists (or Portuguese specialists based abroad) with well established and widely recognised international reputation, and with experience in the evaluation of research.

The final selection resulted from the combination of constraints on the availability of the specialists to conduct the evaluation before March 2003 and the necessity to minimise the number of specialists involved, while ensuring a well-balanced representation of all areas under assessment.

3. Research units under evaluation

The panel assessed the activity of the twelve research units indicated in Table 2, all based at public universities. Because of the eligibility criteria chosen, particular groups belonging to these universities and emerging research units based at other public universities were not assessed.

The units listed in Table 2 can be considered as representative of the research in civil engineering carried out in Portuguese public universities. They involved, at the time of the evaluation, a permanent research staff of over 220 researchers with doctoral degrees, an increase of nearly 50% on the number of PhD researchers registered in the evaluation

held in 1996. They accounted for over 90% o f the university based Portuguese researchers in civil engineering with the same degree.

Table 2: Research units subject to evaluation

Research Unit	*Host institution*	*Designation*
Centro de Engenharia Civil	U. Beira Interior	CEC-UBI
Centro de Engenharia Civil	U. Minho	CEC-UM
Centro de Estudos da Construção	U. Porto	CEC-UP
Centro de Estudos de Hidrosistemas	U. Tec. Lisboa	CEHIDRO-UTL
Centro de Hidráulica, Recursos Hídricos e Ambiente	U. Porto	CEHRA-UP
Centro de Sistemas Urbanos e Regionais	U. Tec. Lisboa	CESUR-UTL
Centro de Investigação em Engenharia Civil	U. Coimbra	CIEC-UC
Centro de Investigação em Estruturas e Construção	U. Nova Lisboa	CIEC-UNL
Centro de Inv. do Território, Transportes e Ambiente	U. Porto	CITTA-UP
Inst. de Engenharia de Estruturas, Território e Construção	U. Tec. Lisboa	ICIST-UTL
Instituto de Tecnologias de Produção na Construção	U. Coimbra	ITPC-UC
Lab. Tecnologia do Betão e do Comportamento Estrutural	U. Porto	LABEST-UP

In the evaluations held in 1996 and 1999, the research activity at the Department of Civil Engineering of University of Porto developed under a single and relatively large unit, CEDEC-UP. Following the suggestion made in the last evaluation, this unit was recently reorganised and divided into four units, namely CEC-UP, CEHRA-UP, CITTA-UP and LABEST-UP. CEC-UBI and CIEC-UNL are newly formed units, which have used this evaluation to join the group of Civil Engineering research units regularly funded by FCT.

Shown in Table 3 are the percent shares in terms of permanent PhD research staff and the areas of activity covered by the different units subject to the evaluation. Nearly 44% of the researchers are concentrated at Instituto Superior Técnico, Technical University of Lisbon, and nearly 29% are based at the Faculty of Engineering of the University of Porto. This represents a slight decrease from the numbers registered in 1996, namely 50% and 33% respectively. The shares of the units based at the more recent faculties and schools of University of Coimbra and University of Minho changed from 16% and 7% to 11% and 8%, respectively.

All units are directly related with the civil engineering departments of the host universities. The information given in Table 3 shows that all universities develop work in the major

areas of civil engineering, irrespectively of the dimension of the unit. It also shows that, at national level, nearly 50% of the researchers concentrate their activity in two areas only, namely structures and construction. A similar number is registered in the evaluation held in 1996.

Table 3: Profile of the research units assessed

Designation of the unit	Relative dimension (%)	Main areas of activity
CEC-UBI	4.5	All major areas
CEC-UM	7.7	All major areas
CEC-UP	15.8	Structures. Construction
CEHIDRO-UTL	8.6	Hydraulics, Water Resources
CEHRA-UP	5.9	Hydraulics. Water Resources
CESUR-UTL	7.7	Systems, Transport, Planning
CIEC-UC	3.6	Geotechnics, Transport, Planning
CIEC-UNL	4.1	Structures, Construction
CITTA-UP	3.2	Transport, Planning
ICIST-UTL	27.6	Structures, Construction
ITPC-UC	7.2	Structures, Construction
LABEST-UP	4.1	Concrete Structures

4. Procedure of evaluation

All unit leaders were informed in due time that the performance of the units would be assessed by an international panel of evaluators, and that this assessment would be based on the documentation they had submitted and on site visits. No detailed information was passed directly on to the units regarding the criteria to be used in the assessment. as it is has been publicly available since the first evaluation was held.

The panel co-ordinator and a FCT official met with all units in January 2003 to clarify the organisation of the site visits, to define the dates and procedures of these visits and to inform the units about the composition of the panel of evaluation. All units received in due time the official confirmation of the schedule of the site visits that would take place. The unit leaders were asked to prepare the unit for a three stage interaction with the panel members, namely: Concise presentation of the unit by its leader; Interchange with the

panel members on the scientific content of the research, and; Visit to the installations of the unit to clarify the situation regarding personnel, equipment and facilities.

Panel members were informed in due time of the framework, objectives and criteria of the evaluation process and were provided access to the reports submitted electronically by the units. Based on these reports, panel members graded the units on the items listed in Tables 5 to 7. A preliminary meeting was held on the day of arrival in Lisbon, to clarify the aspects raised by panel members. The organisation of the site visits practised in this evaluation is summarised in Table 7. This schedule was prepared by the panel co-ordinator and approved by all units under assessment. The items assessed in this period of the evaluation are listed in Tables 8 to 10.

Whenever possible, meetings were held during the five days of the site evaluation. The final panel meeting was held in the last day of the stay. During this meeting, panel members agreed the overall grading of each unit, but could not establish the policy to allocate Special Programmatic Funding. The final report of the evaluation was agreed upon after the panel members returned to their home countries. Drafts of the report were circulated and amended until all members involved reached a unanimous decision. The same procedure was adopted to agree on the recommendation for Special Programmatic Funding.

Table 4: Planning of the site visits

Day	*Visit to units and meetings*		*Work lunch*	*Visit to units and meetings*	
Monday 10 February	9:00-12:00 ICIST-UTL		12:15-13:30 (with unit)	14:00-15:00 ICIST-UTL	16:00-18:00 New units
Tuesday 11 February	9:00-12:00 CEHIDRO-UTL		12:15-13:30 (with units)	14:00-17:00 CESUR-UTL	
Wednesday 12 February	9:00-12:00 CEHRA-UP		12:15-13:30 (with units)	14:00-18:00 CEC-UP	
Thursday 13 February	9:00-11:00 CITTA-UP	11:00-13:00 LABEST-UP	13:15-14:30 (with units)	15:30-18:30 CEC-UM	
Friday 14 February	9:30-12:00 CIEC-UC		12:15-13:30 (with units)	14:00-17:00 ITPC-UC	

After FCT announces formally the results of the evaluation, the panel co-ordinator intends to visit each unit. The same procedure has been adopted in the evaluation held in 1996 and it proved to be useful to exchange views on the performance of the units in terms of the documentation they had submitted and of the strategy and quality of their presentation. These visits proved also to be important to clarify different questions raised on the evaluation process and on the evaluation results and recommendations.

5. Preliminary evaluation

The preliminary evaluation was based on the reports submitted by the units. One unit (CESUR-UTL) had not submitted the report in due time, and another (CIEC-UNL) did not submit the English version of the report. In the evaluation held in 1996, a number of units had either not submitted or submitted relatively poor English versions of the reports.

Despite this improvement, and as it has been experienced since 1996, panel members were not fully satisfied with the reports submitted by a significant number of the research units under assessment. Desirable standards were not attained in terms of identification of the object, objectives and strategies of the units and of the research projects they developed, the innovative work they produced, and their interaction at both national and international levels. Identification of sources and amounts of funding were equally considered to be either insufficient or not presented in a conveniently structured way.

Besides the improvement of the structure and the relevance of the information contained in these reports, panel members strongly recommend FCT to incorporate in the reports or to provide to the evaluators the information in a form suitably processed to support the efficient implementation of the evaluation. Suggestions and recommendations to this effect are summarised in Appendix I.

6. Results of the preliminary evaluation

The results of the preliminary evaluation of the research units are given, in global terms, in Tables 5 to 7. The global average marks are computed from the average marks obtained at unit level, weighed by the number of permanent PhD researchers. The marks grade from 'Poor' to 'Excellent', through 'Fair', 'Good' and 'Very Good', in a scale from 1 to 5.

The average marks are, in some items, affected by significant variations in the grades of individual researchers, which are there explicitly stated in the unit reports appended. These variations are very much induced by the structure and the quality of the reports and

by the disparity found in the groups. The data in parentheses in Tables 5 to 7 refer to the results reported in the evaluation held in 1996. It is noted that the two newly formed units, CEC-UBI and CIEC-UNL, do not contribute for this summary and that one unit in the 1996 evaluation, CEDEC-UP, is now replaced by four newly formed units.

Table 5: Preliminary evaluation on the results of research

Item	*Minimum*	*Average*	*Maximum*
Publications in major research journals	1.7(1.4) 2 units (1)	3.0 (2.9)	3.7(3.8) 1 unit (1)
Supervising of PG students, training of younger researchers	2.5 (2.0) 1 unit (1)	3.0 (3.1)	3.7(4.0) 1 unit (1)
Involvement of young researchers and post-docs in the research activity	1.8(2.3) 1 unit (2)	2.7 (3.8)	3.3 (5.0) 1 unit (1)
Organisation of scientific meetings and regular seminars	1.8(2.0) 1 unit (3)	3.1 (3.5)	3.8 (4.0) 2 units (2)

Table 6: Preliminary evaluation on the relevance of the research activity

Item	*Minimum*	*Average*	*Maximum*
Breath and depth of ongoing/planned research	2.7 (2.6) 1 unit (1)	3.4 (3.3)	3.7(4.0) 1 unit (1)
Current importance of research themes	2.3 (2.5) 1 unit (1)	3.2 3.7)	3.8(4.7) 1 unit (1)
Multidisciplinarity and relevance for other research areas	1.8(2.7) 1 unit (2)	2.7 (3.5)	3.3(4.3) 1 unit (1)
Contribution to research activities in other institutions	2.3(1.0) 2 units (1)	2.8 (3.2)	3.2(4.0) 1 unit (1)

Table 7: Preliminary evaluation on internationalisation

Item	*Minimum*	*Average*	*Maximum*
Joint papers with foreign researchers	1.2(1.5) 1 unit (1)	2.4 (2.6)	3. 2 (5.0) 1 unit (1)
Participation in international projects	1.7(2.0) 1 unit (2)	3.0 (3.4)	3.7(4.8) 1 unit (1)
Interaction with foreign researchers and/or research units	1.7(2.0) 1 unit (2)	3.1 (3.7)	3.7(5.0) 1 unit (1)

The information collected in the tables above shows a global average assessment of "Good' in all areas considered, namely results of the research, relevance of the research and internationalisation, with the exception of the items on involvement of young researchers, multidisciplinarity, contribution to research in other institutions, which grade as "Good-Fair".

The item on joint papers with foreign researchers grades similarly, as it did in 1996, when all other items graded as 'Good'.

The global minima and maxima are determined by the average marks obtained by a given unit or set of units. The minimum marks are in the 'Fair' grade, with few items nearing or reaching the lowest mark of 'Poor'. The highest marks are typically graded as 'Very Good-Good" with no item nearing or reaching the mark of 'Very Good'. As it is shown below, the clear and uniform drop in the highest grades in the 1996-2001 period is very much related with the change registered in the performance of the unit graded first in all evaluations. A mixed variation is found on the lowest grades, with a positive global tendency. Most of the lowest grades are due to the performance of two newly formed units.

In the 1996 evaluation, the weakest marks, in all ranges, were publications in major research journals and joint publications with foreign researchers. This confirmed the practice in civil engineering of prioritising the presentation of the results of research in national and international conferences and insufficient international networking, which seem to persist. A relative qualitative improvement is noticed now, however, as most of the publications with foreign researchers registered in 1996 occurred mainly in the more recent units and reflected doctoral research done abroad.

It is stressed that the most substantial drops in average performance indicate a clear loss in vitality, as they refer to items such as the involvement of young researchers in the

research activity and in multidisciplinarity and relevance for other research areas. It is recalled that in 1996 the highest marks were given to the involvement o f young researchers, to the current importance of the research themes and to the interaction with foreign researchers and research institutions.

7. Site evaluation

Panel members found that the planning summarised in Table 4 was too tight and too intensive. It originated serious difficulties in holding regular formal panel meetings and it did not allow panel members adequate time for individual work during their stay in the country. The implementation of the recommendations summarised in Appendix II may solve the difficulties and inadequacies detected in this evaluation.

Panel members did not visit the facilities of the newly formed units, CEC-UBI and CIEC-UNL. Contact was limited to the meetings with presentation of these units, held in Lisbon. All other units adopted the three-stage planning of the site visits suggested by FCT, as agreed in the preliminary meetings held with the panel co-ordinator. It consists in a formal meeting, where the presentation of the unit is followed by a period of discussion, and closes with a visit to the facilities and interaction with staff members. This sequence was not followed in the site visit to CEC-UM, to respect its suggestion of starting the site visit with the visit to the facilities, due to specific time constraints.

The quality of the presentations varied significantly in terms of content, but none deserves the negative comments registered in the reports of the evaluations held in 1996 and in 1999. Only three units reached good levels in presenting in a clear and objective way the profile of their staff, their research areas and the supporting national and international projects, the structure and sources of funding, the characteristics of their experimental and computer laboratories and of their supporting facilities. Of these units, only CEC-UM and CIEC-UC presented quantified targets in scientific production and related convincingly their objectives and strategies with the recommendations of their advisory boards.

The second stage of the site evaluations is designed to establish a direct interaction between the staff members and the panel. It was very lively in most occasions and useful in all instances to confirm or correct the preliminary assessment the panel members had made based on the reports submitted by the units.

This interaction extended into the third and last stage of visiting the facilities of the units. In what concerns the attitude of the researchers, the panel members found that they usually responded in a highly motivated, open and fair way to the questions they raised.

The meetings showed clearly that the evaluators valued strongly the interaction they established with the researchers, which had a direct impact on their assessment of the unit.

Particular to this evaluation was the request made in due time by the panel to meet staff members with specific profiles, namely PhD members with no publications in international and/or national journals, students in the early stages of their MSc and PhD programmes, and recently graduated PhD staff members. These meetings were held privately in most occasions, as requested. The meetings with PhD members with no publications in international and/or national journals did not take place in all units with staff members in those conditions. However, panel members consider that this initiative was most useful and that it should become Standard practice in future evaluations.

A second aspect that marked this evaluation was the different emphasis the units placed in the presentation of their specific needs, namely in equipment and grants. Most units mentioned these needs in their presentations, although with different degrees of detailing and justification. However, CITTA-UP and all units based at Technical University of Lisbon made no reference to this topic, explicitly mentioned in the letter sent by FCT to formalise the dates and procedures of the site visits. This difference in criteria complicated immensely the panel discussions on the allocation of programmatic funding, to the extent of leading to the decision of recommending FCT most strongly to include this topic explicitly in the reports submitted by the units (see Appendix I). The panel recommends, also, that these report should include a section to justify the use, developments and results obtained with Special Programmatic Funding eventually allocated to the unit in the preceding evaluation.

8. Results of the site evaluation

The global results summarised in Table 8 show that the evaluation of the intrinsic merit of the activities of the units reflects the impressions recorded in the preliminary assessment, with minor adjustments in the items addressed in both cases.

The most relevant receding average marks affect organisation of meetings, interdisciplinary ventures, national and international interactivity, and knowledge and technology transfer, the latter in terms of quality and not of quantity. With the exception of this last item, all others register improvements in terms of minimum marks. The drop in the highest marks in relation to the evaluation held in 1996 is caused, again, by the weakening of the best performing unit.

The global results of the site evaluation on attitudes and work environment collected in Table 9 indicate the existence of localised problems in terms of leadership and insufficiencies in what regards adequacy of the organisation of the units. Particularly worrying is the negative change registered in the assessment of culture creativity and encouragement of younger researchers.

The facilities used by the units hosted by University of Porto in the evaluations held in 1996 and in 1999 and by University of Coimbra, in 1996, were graded insufficient and inadequate in general, in particular in what concerns the experimental segment. The results summarised in Table 10 show the quality of the facilities has improved significantly and reached good standards in general terms.

With few exceptions, libraries seemed to be sufficiently equipped. Moreover, the panel did not register difficulties on the capacity of the units and of their host institutions to ensure the regular subscription of scientific journals. The same comment applies to the equipment of computer laboratories, although the units seemed to be differently prepared to respond to the need of securing the funding necessary for regular maintenance and upgrading.

Experimental equipment improved in global terms. However, the units using new facilities, namely those based at University of Porto, reported particular and justified needs. This global improvement in the experimental facilities and equipment has had a positive impact in the quantity and, in general, the quality of the experimental research reported by the units.

Table 8: Site evaluation on the intrinsic merit of the unit activities

Item	*Minimum*	*Average*	*Maximum*
Goals, ongoing and planned projects, strategic development	2.4 (2.0) 1 unit (1)	3.2 (3.4)	3.8 (4.0) 1 unit (1)
Results obtained	2.0 (2.0) 2 unit (2)	3.3 (3.2)	4.0 (4.0) 1 unit (1)
Training of young researchers and students	3.0(2.5) 1 unit (1)	3.3 (3.6)	3.6(4.5) 2 units (1)
Organisation of workshops, colloquia, periodic seminars	2.0 (2.2) 1 unit (1)	2.9 (3.6)	3.6 (4.0) 1 unit (1)
Interdisciplinary ventures	2.2 (2.6) 1 unit (1)	2.4 (3.3)	3.2 (4.0) 1 unit (1)
Interaction with national and international research units	2.6(2.0) 1 unit (1)	3.1 (3.8)	3.5 (5.0) 1 unit (1)
Knowledge and technology transfer, outreach activities	2.4(3.0) 2 units (2)	3.0 (3.5)	3.3 (4.0) 1 unit (1)

Table 9: Site evaluation on altitudes and work environment

Item	*Minimum*	*Ave r age*	*Maximum*
Adequacy of unit organisation and leadership	2.4(1.0) 1 unit (1)	3.3 (3.3)	4.0 (4.0) 2 units (1)
Culture of creativity and encouragement of younger researchers	2.6(2.0) 1 unit (1)	3.3 (3.8)	3.8 (4.6) 2 units (1)

Table 10: Site evaluation on adequacy of resources for research activity

Item	*Minimum*	*Average*	*Maximum*
Facilities	Fair-Good (Poor)	Good (Poor)	Good (Good)
Library	Fair-Good (Poor)	Good-Fair (Poor-Fair)	Good (Good)
Equipment	Fair (Poor)	Good-Fair (Fair)	Good (Good)
Technical support	Fair-Good (Poor)	Fair (Poor)	Good-Fair (Poor-Fair)
Secretarial support	Fair (Poor)	Fair (Fair)	Fair-Good (Fair)
Funding	Fair (Poor)	Fair (Fair)	Good (Fair)

No particular difficulties were detected in what regards administrative support. Some units complained of inadequate budget and project management support. Particularly serious, for most units, is the situation regarding technical support for the operation of computer laboratories and, in particular, of experimental laboratories.

As in previous occasions, panel members could not address conveniently the issue of the funding of the units, simply because there was not a reliable basis of information available. Different numbers were given and different sources were named in the reports of the units and in their presentations.

9. Global results of the evaluation

The activities that received the extreme marks of 'Poor' and 'Excellent' are listed in Tables 11 and 12, respectively, to stress the negative and positive aspects already mentioned in the analysis of the results of the preliminary and site evaluations. It is clear that the research units reflect a process of averaging in quality of output and attitude. The weakest aspect reduces now to one unit with incipient international interaction. This improvement has been obtained at a high cost, as no single unit presents a single item graded as Excellent to Very Good.

Table 11: Activities with lowest partial marks (< 1.5)

Evaluation of 1996	*Evaluation of 2001*
Publications with foreign researchers	Publications with foreign researchers
Publications in major research journals	
Adequacy of organisation and leadership	
Contribution to research in other institutions	

Table 12: Activities with highest partial marks (> 4.5)

Evaluation of 1996	*Evaluation of 2001*
Involvement of young and post-doc researchers	None
Current importance of research themes	
Participation in international projects	
Interaction with foreign researchers/units	
Interaction with national/foreign units	
Culture of creativity	
Enthusiasm and personal commitment	

The final evaluation in terms of overall quality is shown in Table 13. No unit deserved the extreme marks of "Excellent' or 'Poor'. The weighed average assessment of the civil engineering research units produced a global result of 'Good to Very Good', as in the previous evaluations. The direct average brings down to 'Good' the global result of the evaluation

Table 13: Overall quality

Overall quality	*Number of units*		*Relative weight (%)*	
	1996	*2001*	*1996*	*2001*
Very Good	1	0	32.7	0
Very Good-Good	0	1	0	30.2
Good- Very Good	0	3	0	22.3
Good	3	4	49.8	37.6
Good-Fair	2	9	10.9	9.9
Fair-Poor	1	0	6.6	0

Table 14: Relative positions of the research units

Unit and host university	*Evaluation*				*Extreme marks*	
	1994	*1996*	*1999*	*2001*	*Lowest*	*Highest*
CEC-UBI	-	-	-	Fair	-	-
CEC-UM	2	F-P	G	Good	1(16)	2(0)
CEC-UP	1	G	G	Good	2(1)	0(0)
CEHIDRO-UTL	1	G	VG	Good-Very Good	0(1)	3(0)
CEHRA-UP	1	G	G	Good-Fair	8(1)	1(0)
CESUR-UTL	1	G	G	Good-Very Good	1 (2)	1(4)
CIEC-UC	2	G-F	G	Good	1(2)	1(0)
CIEC-UNL	-	-	-	Good-Fair	-	-
CITTA-UP	1	G	G	Good-Fair	5(1)	0(0)
ICIST-UTL	1	VG	VG	Very Good-Good	0(0)	9(18)
ITPC-UC	2	F-G	G	Good	6(2)	4(1)
LABEST-UP	1	G	G	Good-Very Good	1(1)	4(0)

The overall quality grades are summarised in Table 14 for all research unit evaluations held to the present date. The last three evaluations use the same format, criteria and procedures. which are substantially different from those used in the first evaluation.

It is noted that the grades given in Table 14 for all units hosted by University of Porto in previous evaluations are those of the single unit they combined into, CEDEC-UP, until the present exercise.

The results summarised in Table 14 show that in 1994 the units were ranked in two groups, with the first position shared by the units hosted by University of Porto and Technical University of Lisbon. The subsequent results show a sustained improvement of the units graded lowest and the present evaluation penalises the units graded highest in 1999. The effect of the decomposition of CEDEC-UP, systematically classified as a highly heterogeneous unit is also visible in this evaluation.

This relative movement is stressed by the fact that two units were systematically responsible for the highest and lowest grades registered in the 1996 evaluation, respectively the CEC-UM with 16 of the lowest grades and the ICIST-UTL with 18 of the highest grades, as shown in parentheses in Table 14. Now three units are responsible for (increased) lower marks, namely CEHRA-UP, ITPC-UC and CITTA-UP, while substantial advantage in the highest marks evidenced by ICIST-UTL in 1996 is still visible but has deteriorated significantly.

10. Special programmatic funding

As part of the evaluation process, panel members are requested to assess the adequacy of additional Special Programmatic Funding. According to FCT policy, this funding should be granted to a restricted number of units, as a result of specific needs detected by the evaluators. The adequacy of this funding is to be considered independently of the research unit size, research area or form of organisation. The main criteria to be used in selecting units to be proposed by the evaluators for this funding are: Clear needs of operation, maintenance or small equipment funds for carrying out high quality research activity; Potential for increased high quality research results and internationalisation, and; Opportunities for increased research performance that could be enhanced by hiring researchers or technicians.

According to the FCT guidelines, in evaluating eligibility for such funding, it is essential to observe that the additional funding must correspond to increases in performance that could not be attained with the funds that the unit has had available in the past or is likely

to have in the future. It is not appropriate to consider this instrument of funding to replace or shift financial allocations faced by the unit in the past or likely to be faced in the future without this funding. Moreover, these recommendations must include proposals of the appropriate amounts of additional funding, their uses, time span, associated performance expectations, and requirements to be included in the corresponding contract.

The panel found it difficult to converge to the proposal summarised below and detailed in the unit reports appended. The guidelines are clear, in a context of intended flexibility. However, the necessary data should have been provided in more uniform and adequate terms. No information is requested or has been provided in the reports of the units (see recommendations in Appendices I and II). All units, with the exceptions mentioned above, made specific reference to needs to be met through this instrument. However, the degrees of specification and of justification were variable. Moreover, the panel was informed that FCT was running a parallel programme to re-equip the research units.

After consultation and exchange of individual proposals, and in full respect of the guidelines set by FCT, the panel decided to address two basic and strategic needs, namely equipment and hiring of researchers, which are well stressed in this report. They were identified at unit and group levels. The panel decided to allocate to the highest grade, Most Strongly Recommended (MSR), a sum equivalent to a three-year basic funding of the units. The items graded as MSR that could not be accommodated in this way are either funded partially or degraded to Strongly Recommended (SR), whenever the panel found more important to fund fully other equipment.

The items finally graded as Most Strongly Recommended resulted from additional exchanges and consultations based on a proposal established in the following sequence. Fifty percent of the budget was allocated strictly on terms of merit, at group level, independently of the needs expressed by the units, and constrained by the requirements on increased high quality research results and internationalisation. Funding for equipment was added next, according to the needs enunciated by the units, under the same constraints and provided that the panel members had recognised those needs and graded them as MSR. This result was then adjusted. at unit level and by sum or deletion, to meet the lowest proposal for MSR funding submitted by individual evaluators. The proposal thus obtained was then adjusted to correct distortions and unmet needs, to obtain the result summarised in Table 15.

Table 15: Recommendation for special programmatic funding (in Euro)

Unit	*MSR*	*SR*	*R*
CEC-UM	272,000	-	-
CEC-UP	358,000	75,000	125,000
CEHIDRO-UTE	300,000	-	-
CEHRA-UP	400,000	283.000	10,000
CESUR-UTL	150,000	-	-
CIEC-UC	150,000	252,000	-
CITTA-UP	100,000	-	-
ICIST-UTL	320.000	-	-
ITPC-UC	160,000	42.000	347,000
LABEST-UP	290,000	102,000	-
Total	2.500,000	754. 000	482, 000

11. Relative strengths and weaknesses

The preliminary and site evaluation results summarised above define the profile of a mature research community, aware of the international developments in their area of work and interacting still insufficiently with the international community. It did not succeed in the past few years to attain the central objective of establishing everyday levels of internal, national and international co-operative work that are characterised by the production of a significant amount of jointly published work through effective networking.

In very broad terms, the most obvious improvement registered in this evaluation is that adequate basic working conditions are provided for, in all units and in what regards facilities and equipment. The panel detected specific and localised needs in experimental equipment and, more frequently, in technical support. Despite this difficulty, the evaluation now held registered good progress in the effort, in most units, of combining numerical modelling with experimental testing.

All units have the means, the conditions and staff required to produce good quality research work. The panel stresses, however, that CEC-UBI and CIEC-UNL face difficult challenges, which are identified in the reports on these newly formed units. For all

remaining units, this evaluation registers a global and consistent improvement on the major weakness exposed in previous exercises.

However, this evaluation registered, also, a regress in the indices that led the 1996 evaluators to characterise the research community as relatively young, very active and committed, and interacting with the international community. It is important, therefore, to identify the causes that may justify this loss of impetus in research that affects all established units, with the exception of CESUR-UTL, although in very localised areas, and that have prevented the units to attain the expected levels of internationalisation, in terms both of presence and co-operative research work.

Organisation and cohesion of the units are persisting weaknesses. Au units present themselves as such but most project the image of being federations of groups. Only one unit, ITPC-UC, assumed openly a policy of laisser-faire, which did not seem to prove to be particularly successful. Very few units could present a well thought and established position in terms of mission, policy, objectives and strategies. Moreover, this impression seems often to be valid also at group level.

The exception is LABEST-UP, which is essentially a group that decided to become autonomous precisely to gain in organisation and cohesion, and the grades show that the panel has supported this option. However, this should not be interpreted as an incentive to invert the effort made to induce units to value the importance of critical mass. Quite differently, it means that critical mass should not be gained at the cost of losses in coherence, cohesiveness and performance in larger but inadequately run units.

This leads to the following comment on the staff policy in practice. Panel members cannot understand why most units host a substantial number of members that seem to have had no contribution to its research output. The numbers found in these evaluations are quite worrying. The percentage of PhD staff members that have not published in international archive journals over the three-year period is as high as 50%, and the equivalent number for those members that published neither in national nor in international journals in the same period is as much as 35%. Panel members call the attention of FCT to this situation, particularly in what concerns the allocation of regular basic funding linked to permanent staff members that do not contribute to measurable research output.

This fact has had a direct impact on the average found for the low ratio (0.35) on the number of papers published in international journals per permanent PhD staff member per year. The ratio found for all units on the number of PhD theses published per year and per

PhD staff member (0.11) deserves particular attention, as it may translate a strong deceleration in the research produced at national level, both in quantity and in quality.

The rate of completion of PhD theses is a matter of great concern. Part-time PhD research is unlikely to lead to high quality work, as it needs to be focused and completed within a specific short time. It is the panel opinion that that the maximum time allowed for a candidate to undertake paid outside work should be strictly limited in the instances this possibility is allowed by contract. The period of registration for such a candidate to submit his thesis should be four years, which could be extended by a maximum of one year if there are mitigating circumstances.

PhD and MSc theses need to respond to problems not only at international level, but also at local, regional and national level. Very often, MSc theses can address local and regional problems, whereas PhD theses should take on problems with a strong international relevance, which will lead to data publishable in international archive journals.

Panel members understand the difficulties felt in attracting quality doctoral students and can only urge the implementation of policies to find these students in the country and abroad. Besides stressing the importance of a strong and stable policy on doctoral and post-doctoral grants, panel members insist on the importance of linking this local training with networking, in order to enhance the internationalisation of the research work of the units.

It is fair to associate the production of scientific papers with the production of doctoral theses. It is equally fair to notice the relatively low number of PhD students per PhD staff that has been registered in most units and groups that have been evaluated. Even so, the panel must stress that the size of the permanent PhD staff of most units and groups is frequently larger than the combination of PhD staff and doctoral students found in well known research centres that present substantially higher performance indices.

The low ratios mentioned above suggest, also, the questioning of the policy of the units on consulting work, an aspect present in the reports of all evaluations held since 1996. There are immense benefits in allowing staff to maintain contacts with industry, but this should be strictly controlled (to one day a week with a maximum of thirty days, in some countries). If consulting brings direct benefit to research, and is directly related to research, this period could bet extended up to a given maximum (say, to fifty days a year).

For the reasons already stated, the panel could not judge on the adequacy of the budgets run by the different units, but formed the idea that the proportion obtained through

consulting is too high. It is very difficult to combine successfully a strong presence in research and in high-quality consulting, either at unit level or at group level. The general impression is that most of the consulting work reported is not at the particular high level that should characterise the intervention of research units. This is probably due to an insufficiently regulated system and it seems that this insufficiently regulated practice has had a negative effect on the research output of the units. If that had not been the case, its reflex would have been visible in publications and in doctoral programmes.

Yet another cause for insufficient levels of performance is the tendency to address a too large number of research topics at group level. Only one or two researchers per topic are found frequently. This number is low and questions the strength and the suitability of the research topic. In addition, some of the topics selected are in fact support activities or services. It is difficult to perform well at international research level without continued attention and effort focused on few and adequately selected topics.

The panel stresses that the comments and numbers given above apply to most units, independently of their size, but not in a uniform way. This degree of heterogeneity is indeed stronger at unit level. Units can produce excellent work in some aspects and be completely inactive in others, explicitly assumed in their research plans. Hence, and as a rule, the groups of a given unit present quite different research performance indices. Although they constitute minorities in all instances, the global and unit average numbers on the rates of publications and of concluded PhD theses is due mainly to the output of these best performing groups.

Heterogeneity in performance has been addressed in the reports of all evaluations held since 1996, where the option for a two-speed system was explicitly raised. FCT, the units and the groups should not delay in engaging in an open and decisive discussion on this issue. It is urgent to weight the benefits and the costs of the results reported in this evaluation, that is, of succeeding in improving the lower indices in research performance while failing in maintaining the high standards reached by particular groups in particular topics.

It seems clear that the policy of combining research with a strong presence in non-specialised consulting yields loss of impetus in quality research and leads to averaging the performance to levels below the individual capacity of the permanent staff members of the unit. Units and groups that value high quality research must face this fact pragmatically and reorganise or restructure accordingly. The same attitude should characterise the questioning of the open-door policy that permits the presence of permanent staff members without regular and/or visible contributions to research.

Units or groups that aim at performing at high international standards should pay particular attention to strategic planning, supported by adequate and selective funding and incentive policies. It is essential to identify topics of research where excellence can be achieved, as it is fundamental to participate in international networks and to establish quantified targets in terms of scientific production and results, and of funding for equipment, grants and mobility.

The investment made to attain specific levels of expertise and to improve the general Standard of performance should be sustained and encouraged. It is essential, for that purpose, that the units, together with their advisory boards, address the fundamental questions of mission, organisation, staff and consulting policies and strategic planning.

Unlike other disciplines, civil engineering products are often designed for over a hundred years. There is, therefore, a need for both short-term as well as long-term research. Units need to plan both. Three criteria should govern all civil engineering research for the 21-st century, namely environment, sustainability and durability. University research should lead the thinking in this respect.

12. Closure

Most of the comments and recommendations stated below are taken from the report of the evaluation held in 1996. The fundamental differences that can found are on the quality of the research facilities, where no serious inadequacies were detected in this exercise, and the improvement registered in the less performing areas and units. This improvement has coincided with a loss in the impetus of the better performing units and groups, the cause of which should be clearly identified in order to establish policies and implement the measures necessary to recover the levels registered before.

The overall assessment resulting from this evaluation of the university based civil engineering research units confirms the existence of human resources and material means sufficiently strong and sound to justify a rewarding investment on research and development.

Besides investing in particular areas of knowledge, it is still necessary to increase the dimension of the research-trained community, through doctoral research grants, and to promote its mobility within the university and national laboratory systems, and, in particular, towards national and private services systems. It is necessary, also, and still in co-operation with the national laboratories, to overcome localised insufficiencies in experimental equipment and in technical staff.

Academic authorities should consider the hiring policies in practice and find forms to increase the mobility of researchers within the country and their co-operation with foreign research units. They should, also, be helped to improve the efficiency of the administrative, technical and project management supporting services.

An integrated policy for the development of research in civil engineering is needed to achieve adequate levels of efficiency in resource utilisation. The definition of the targets and strategies of this policy should exploit to its advantage the small dimension of the country and the fact that there is a fairly accurate diagnosis of the strengths and weaknesses of the different research units.

This policy should promote and support the ability of the country to develop its own pool of knowledge, even in domains where the national industry and services cannot benefit directly and in the short term from the results of the research. This policy should always promote quality through competition at all levels and be supported by regular and rigorous assessments of the results achieved with the allocation of the research funds.

Independently of the policy to be decided on the selection of areas for strategic development, a two-front action should be pursued, investing in those areas and groups where higher standards have already been attained and, simultaneously, promoting the maintenance and development of competence at national and regional levels.

It should, also, value the aspects that typify research in civil engineering, namely its strong interdisciplinary nature and close interaction with the industry and the profession, and contribute to overcome the structural deficiencies that have been detected in research units.

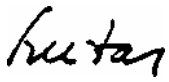
The panel stresses the inadequacies reported in the organisation of the units and in their identification of objectives and strategies, that frequently leads to an unproductive dispersion in a number of insufficiently staffed research topics and to a significant number of researchers with low scientific productivity indices. Equally important is to regulate Consulting work, which should be encouraged provided that it yields adequate levels in incorporated research and development.

The panel stresses, also, the need to implement policies to improve substantially the rates found in the production of doctoral theses. They should be so designed as to strengthen the levels found in national and international mobility, both within the research community itself and within the civil engineering community at large.

Thus, this policy should contribute actively to modify the perception that links training in research with academic or research careers. It is of fundamental importance to establish

the idea that a doctoral programme is rather more an instrument of advanced study and training than of direct specialisation in a research topic, as it can provide the culture, the knowledge and the training essential to ensure the success in professional careers in industry and services.

This report has been approved by all panel members. Lisbon, April 9, 2003



JA Teixeira de Freitas Panel co-ordinator

Appendix I

Recommendations on the unit reports

1. General recommendations

Panel members found no difficulty in accessing the unit reports. However, they recommend FCT most strongly to reformulate these reports, as the present structure cannot be used to extract easily and with the necessary degree .of certainty the information required to fulfil the evaluation requirements.

All data, information and statistical analysis prepared by the units and included in the written reports should strictly be confined to the period under evaluation, which should be stated in an unequivocal manner. Otherwise, the numbers tend to create confusion.

If this is the actual practice, this confusion may originate in the structure of the report and/or in the presentation of the unit during the site visit (see Appendix II). Most of the recommendations presented below target the clarification of this information and are designed to simplify the assessment of the reports.

It is noted that the comment above covers all items under assessment. In particular, the panel found serious difficulties in assessing all matters directly related to funding. Reports of the units should clearly show the funding received from FCT during the period of evaluation, state if it was earmarked, and how it was spent.

One of the measures that are recommended below is the break down of numbers to group level. When a specific item is shared (for instance, a publication), its allocation should be divided proportionally.

2. Form B: Unit Characterisation

One item should be added, to identify the advisory committee of the unit.

The Unit Description (B.1) should include explicitly the definition of the mission o f the unit and of objectives and strategies.

The Unit Organisation (B.2) should include a table with a profile of its groups:

Profile of the staff of the unit

Group	PhD Members	Non-PhD Members	Administrative Staff	Technical Staff
1				
2				
…				
Unit total				

The table in Team's Scientific Production (B.3) should be extended to include the identification of the group of the staff member.

FCT should state clearly what are International Journals with referees (certainly not non-Portuguese journals with referees), eventually those that are indexed. It should make clear, also, if accepted but not yet published papers are to be listed or, to avoid confusion, simply omitted. In what regards books, FCT should clarify also the distinction in the different possible roles, namely as authors or as editors). Moreover, the following tables defining the group and unit profiles should be added:

Publications: Totals per group and for the unit

Group	Papers in Int. Journals With referees	Papers in other Journals with referees	Books	Chapters in books	Communications in proceedings with referees	Other publications
1						
2						
…						
Total						

Publications: Same as before, but per PhD member and per year

Group	Papers in Int.	Papers in	Books	Chapters	Communications	Other

	Journals with referees	other Journals with referees		in books	in proceedings with referees	Publications
1						
2						
…						
Total						

Supervision of theses: Totals per group and for the unit

Group	PhD		MSc	
	Concluded	In progress	Concluded	In progress
1				
2				
…				
Total				

Supervision of theses: Same as before, but per PhD member and per year

Group	PhD		MSc	
	Concluded	In progress	Concluded	In progress
1				
2				
…				
Total				

The Facilities (B.4) description should address library, office space, computer and experimental laboratories, with a succinct description of suitability and of relevant equipment.

3. Form C: Unit Research Team

Should be extended to include information on supporting technical and administrative staff (two new items, say C.3 and C.4).

4. Form D: Unit Funding

The tables on Global Funding and on Research Projects with Approved Funding should be extended to include a column on Budget Managed by the Unit.

A new item should be added, summarised as follows:

Profile of the funding managed by the unit

Group	Int. R&D projects	Nat. R&D projects	Pluriannual funding	Programmatic Funding	Consulting contracts	Othersources
1						
2						
…						
Total						

Same as before, but per PhD member and per year:

Group	Int. R&D projects	Nat. R&D projects	Pluriannual funding	Programmatic Funding	Consulting contracts	Other sources
1						
2						
…						
Total						

5. Form E: Unit Triannual Planning

FCT should recommend the units to have particular care in the preparation of this section of the report. It should be succinct, well organised, free of contradictions and duplications and clear to reader that may not know the unit.

The first item in this section should be a summary of the Recommendations of the Advisory Panel of the unit.

The item on Scientific Objectives and Proposed Activities (E.1) should be organised as follows: a) At unit level (for the three-year period), integrating the scientific objectives and proposed activities of the groups and relating it with the recommendations of the advisory panel, and; b) At group level (for the three-year period), stating scientific objectives and proposed activities of the groups and relating it with the projects under development and with the supervision of MSc and MSc theses.

The panel recommends most strongly that the needs of the unit are explicitly addressed in the report, which should be clearly identified, quantified, prioritised and justified.

The presentation on Co-operation (E.2) should be organised similarly, and include Bilateral National Co-operation, Bilateral National Co-operation. National Networks. International Networks. A new item should be added on and organised as follows:

Quantified Targets

Group	1	2	…	Total
Organisation of nat. scientific meetings				
Organisation of int. scientific meetings				
MSc theses concluded				
PhD theses concluded				
Refereed nat. scientific publications				
Refereed int. scientific publications				
New nat. R&D projects				
New int. R&D projects				
Registration of patents				

6. Form F: Additional Elements

The structure of this form can be preserved, with the intent of supporting the information presented in the other parts of the report. However, all lists (namely those of publications)

should be given at unit level and organised alphabetically to simplify the detection of duplications caused by poor editing.

The panel noticed a large diversity in what was reported as Scientific Meetings. FCT should consider the possibility of setting adequate guidelines to clarify this matter.

7. Special programmatic funding

The report should include a section to justify the use, developments and results obtained with Special Programmatic Funding eventually allocated to the unit in the preceding evaluation.

Appendix II
Recommendations on the site visits

1. General recommendations

To be effective, useful and helpful, the evaluation should be completed within six months following the end of the period under evaluation. Panel members found that the site visits were most useful. They should be preserved but so reorganised as to ensure a more efficient use of time. The following aspects are the most relevant.

2. Panel meetings

The organisation of the arrival of panel members must ensure that sufficient time is allocated to hold the preliminary panel meeting. This meeting is very important to clarify the process of the evaluation, as well as aspects raised by the assessment based on the reports submitted by the units.

The site visits should be so organised as to ensure two free half-days, in the middle and at the end of the site visit period. These breaks are very important to hold longer panel meetings and to allow panel members the necessary time to work on their individual reports. The schedule for the remaining days should allocate two periods, of one hour each, for panel meetings and for individual work of panel members.

The stay should close with a full working day, in order to ensure that the panel can decide on two central topics, namely: a) The general assessment of each unit and its final global grade, and b); The policy to allocate the special programmatic funding.

This latter objective could not be met in this evaluation, and it proved quite difficult and time consuming reaching a consensus after panel members returned to their home countries. This caused a substantial delay in the submission of the final report of the evaluation.

3. Site visits

It is feasible to visit two small units (say less than ten PhD staff members) in half a day, and it might be possible to combine small and medium size units (say up to thirty PhD staff members) in the same period.

The three-stage structure of the visit is adequate. However, it is essential to request all units to shorten their presentation to essential profiling aspects, in order to allow more time for interaction with the panel.

The practise of having a general presentation of the host department could be maintained, provided the time spent is marginal (say ten minutes) and the speaker can use it efficiently.

The panel noticed that the statistics presented by the units during the site visits may be substantially different from those that can be extracted (with difficulty) from their reports. This confusion may originate in the use of different time periods in the report and in the presentation. Units may present updated numbers, provided that the numbers for the period of the report are clearly identified and an unequivocal distinction is made from their correction to the date of the site visit.

Panel members consider that their initiative to meet privately with staff members with given profiles was most useful and should become Standard practice. The profiles selected were the following: PhD members with no publications in international and/or national journals; Students in the early stages of their MSc and PhD programmes; Recently graduated PhD staff members.

Panel members found, also, that lunch breaks should be organised as standing buffets to enhance the possibility of interacting with a significant number of unit staff members.

Appendix III
Report on CEC-UBI

CEC-UBI is a newly formed unit that has applied to join the group of Civil Engineering units sponsored by FCT. It is hosted by the Department of Civil Engineering of University of Beira Interior.

After establishing the fundamental means and competence for teaching, university-based units start developing and expanding their research activity to reach the third stage of establishing a structured research unit with appropriately defined mission, objectives, planning and strategy.

CEC-UBI is the in second phase of this process of evolution. It is relatively well served in facilities and staffed by ten permanent PhD members, organised in five groups that cover the main areas of activity in Civil Engineering, namely Construction, Structures. Geotechnics. Water Resources and Environment and Urban Planning.

The report submitted by CEC-UBI is relatively weak in research content, awareness and performance, as measured through the quality, dimension and relevance of projects, the content, depth and preciseness of the planning and the results of the research in terms o f theses and scientific publications. In particular, the Panel notes that researchers wrongly classify, and in a rather systematic way, non-Portuguese but otherwise national publications as international archive journals.

In this context, the Panel pondered the possibility of recommending the unit to maintain its present status and to strengthen its performance by reinforcing the co-operation of its members with units already established. The co-operation established with CEHIDRO-UTL is a good example of how could CEC-UBI evolve rapidly into a well-performing unit by extending its collaboration with other groups specialised in the areas strategic to the unit.

However, Panel members were receptive to the effort being made by the proponents and aware of the importance of stabilising and strengthening the Department of Civil Engineering of University of Beira Interior. Thus, the Panel chose to support the application of CEC-UBI with an entering grade of ***Fair***. According to the criteria established for the evaluation, this means that, globally, research activities are at a fair national level with publications only partially in internationally well-known journals.

CEC-UBI should plan and act carefully and pragmatically to ensure that it evolves into a well-performing unit in the next three-year period. The Panel strongly recommends the unit to develop a carefully thought-out and tightly structured programme of research. It should be clearly focused on specific areas of expertise of the unit, and which will produce high quality research output in terms of both completion of theses and results publishable in internationally, reputed scientific journals.

CEC-UBI faces a very difficult challenge and the Panel does not wish to create false expectations. All staff members of the unit are reminded that the starting basis of CEC-UBI is relatively weak, and that some 40% of the present complement of staff have no publications in an international archive Journal. Further, a similar number do not have a publication either in an international journal or in a national journal. It should not therefore consider lightly the possibility of being downgraded to Poor in the next evaluation, which would imply leaving the group of FCT sponsored units.

Appendix IV
Report on CEC-UM

1. Introduction

The report on the first evaluation of CEC-UM, held in 1996, identified insufficiencies in leadership, cohesion and coherence. In addition, the report mentioned limitations in the capacity to carry experimental research and the negative effect in most of research work caused by an excessive emphasis placed on the solution of every day problems motivated by the interaction of the unit with the local community. The evaluation held in 1999 stressed the improvements in all these areas and up-graded the overall research quality of CEC-UM from ***Fair/Poor*** to ***Good***.

The structure and the overall dimension of the staff of CEC-UM remain basically the same. The unit involves nearly twenty PhD staff members, organised in seven groups, namely Structures, Construction Processes and Management, Geotechnics, Hydraulics, Construction Materials, Urban and Regional Planning and Highways.

2. Unit Evaluation and Recommendations

The present evaluation can only stress the improvements in all these areas, already identified in the evaluation held in 1999. The organisation and the management of the unit seem adequate and CEC-UM projects now a positive image, of a young, dynamic and ambitious group, with talent and expertise in specific areas.

The answers given to the questions raised by the Panel were well formulated and supported, suggesting that due attention is being paid to the fundamental matters of assessment, strategy and planning. Objective targets have been set to each group, combined with the identification of the means that must be engaged to solve particular needs in human resources, equipment and facilities. The Panel believes that this is the result of fruitful co-operation of the unit with its Advisory Board.

Previous evaluations identified strong levels of heterogeneity in the performance of units that were either large in dimension or tried to embrace all the major areas of the activity in civil engineering. CEC-UM fits in the latter category, with the added disadvantage of being supported by a relatively small permanent staff. In this context, the Structures group

succeeds in presenting very good research performance indices, while the remaining six groups grade from fair to poor.

The differences in performance that persist in CEC-UM are particularly obvious in what concerns international co-operation, which is effective in specific areas but remains low in global terms. The same comment applies to the record on publications in international archive journals, which is weak in all areas except Structures. Moreover, the themes under research in the remaining areas of activity seem to be rather common and dispersed, with the exception of Structures and; to a lesser extent, Planning. They are recognised as important for practical application but lack the level of originality required by competitive research.

According to the report submitted by CEC-UM, the ratio of papers published in international journals per permanent PhD staff member per year (0.40) is higher than the average found for all units (0.35). The percentage of permanent PhD staff members that have not published in international journals over the three-year period is high (35%) but substantially lower than the (high) average found (50%). The equivalent numbers found for permanent PhD staff members that published neither in national nor in international journals are 18% and 35%, respectively.

Equally important at unit level is to increase the production of locally supervised PhD theses. The ratio of PhD theses published per year and per PhD staff member is low in most groups, in particular in Geotechnics, Construction Processes and Management and Urban and Regional Planning. The value found for CEC-UM (0.08) is slightly below the (low) average found for all units (0.11). The Panel understands the difficulties felt in attracting quality doctoral students and can only encourage the strategy of finding these students abroad. It is particularly commendable that the unit encourages the possibility to work and write a thesis in a foreign language. Much benefit can come to the unit if this is directed towards English.

The Panel accepts that the Journal published by the unit may play an important role in the implementation a strategy to recruit foreign doctoral students, namely in Latin America, as stated by the unit. However, the Panel believes that it should not be promoted as a research journal, as it may damage the image of the unit (as it may divert the publication culture of the unit away from the international publication forum). It should be offered explicitly as a regular publication on the activity of the unit and on the research opportunities it offers.

The Panel was particularly well impressed with the quality of the leadership of the unit. However, and for some Panel members, this impression could not be extended uniformly to all groups. There is some argument to ensure that there are regular meetings of all the co-ordinators to assess and evaluate technical and secretarial help requirements, the weaknesses and strengths of the groups, and the implementation of the research priorities and strategic goals of each group.

In what regards facilities, the Panel was informed that the unit will benefit soon from an expansion programme being agreed between the host Department and University of Minho. The limitations of the present experimental facilities are rather obvious. The unit did not mention difficulties in what regards technical staff but did stress and justified conveniently its needs in experimental equipment.

CEC-UM now seems to have a sound and forward-looking research basis. The aim of the unit for the next three years should be to consolidate its achievements, and enhance its quantifiable and measurable academic research output in terms of post-graduate research degrees and publications of international standing. In particular, the research output of Groups 2, 3. 4, and 6 is not commensurate with their manpower and research facilities. The Geotechnics Group is clearly under-nourished, and needs urgent strengthening both in terms of academic personnel and research facilities.

The Panel left the site visit with the impression that the unit is aware of its strengths and of its persisting weaknesses, and that it has set targets and devised supporting plans to overcome these limitations. The Panel expects the unit to be aware of the importance of consolidating gains and correcting asymmetries while weighing the risks that typify the early stages of development of ambitious groups, that is, the tendency to run too fast, too lightly and too wide.

3. Preliminary Evaluation

The preliminary evaluation is based on the analysis of the documentation submitted by the unit. As it is stated elsewhere, it is the opinion of the Panel that the structure of the report should be improved, to facilitate both its preparation and its interpretation.

Weaknesses particular to the CEC-UM report are the characterisation of internal archive journals and of the total number of publications in each class, the identification of effective forms of international co-operation, particularly in what concerns joint research projects, and, for all groups, the definition of research objectives and action plans.

The average grades of the Panel are summarised in Table 1. They range from 1 (Poor) to 5 (Excellent). The definition of the second item in Table 1, on Innovative Technological Prototypes and Patents, was interpreted differently by Panel members. The grades marked (n+)/(n$^-$) are affected by n marks above/below average by more than 1.5 points. The variations in the Preliminary Evaluation are very much induced by the structure and the quality of the report and by the disparity found in groups.

Table 1: Preliminary Evaluation

Results	
Publications in major international journals	2.7
Innovative technological prototypes and patents (if applicable)	1.5
Supervising of post-graduate students and training	3.2
Involvement of young researchers and/or post-docs	2.7 (1$^-$)
Organisation of scientific meetings and regular seminars	3.0
Relevance of the Research Activity:	
Breath and depth of ongoing and planned research activity	3.0
Current importance of the research themes	2.8 (1$^-$)
Multidisciplinary and relevance for of the research areas	2.3
Contribution to research activities in other institutions	2.3 (2$^+$1$^-$)
Internationalisation - Quality and Quantity:	
Joint publications with foreign researchers	2.0
Participation in scientific and technological projects with foreign researchers	3.0 (1$^-$)
Interaction with foreign researchers and/or research units abroad	2.8 (1$^-$)

Table 2: Site Visit Evaluation

Intrinsic Merit of the Unit Activity:	
Goals, ongoing and planned projects, strategic development in the near future	3.4
Results obtained	3.0

Training of young researchers and students	3.6
Organisation of workshops, colloquia, periodic seminars	2.8
Interdisciplinary ventures	2.4
Interactions with other national and international research units, and companies	3.2
Knowledge and technology transfer, outreach activities	2.8
Altitudes and Work Environment:	
Adequacy of unit Organisation and leadership	4.0
Culture of creativity and opportunity/encouragement of younger researchers initiative	3.6

Resources for the Research Activity:	
Facilities	Fair / Good
Library - Journals	Fair / Good
Library - Books	Fair / Good
Equipment	Fair
Technical support	Good / Fair
Secretarial support	Fair
Funding	Fair

4. Site Visit Evaluation

The presentation of CEC-UM was one of the best presentations the Panel attended, both in content and in form. It was concise and objective, with well balanced and well designed graphic support. The visit to the experimental facilities was useful to confirm specific needs in space and in equipment, as well as to appraise the research under development.

The direct interaction with staff members, during the visit to the facilities and after the presentation of CEC-UM, was generally lively and open. The Panel valued the private interviews held with staff members: PhD members with no publications in international and/or national journals; students in the early stages of their MSc and PhD programmes, and; recently graduated PhD staff members.

The average grades of the Panel are summarised in Table 2, where the same notation is used. Variations in the grades for Site Evaluation result from positions upheld by Panel members.

5. Overall Research Unit Quality

The panel graded CEC-UM as Good. According to the criteria established for the evaluation, this means that, globally, research activities are at a fair international level and at a high national level, with publications in internationally well-known journals.

6. Special Programmatic Funding

The proposal for Special Programmatic Funding summarised in Table 3 and the recommendations given below result from the application of the criteria and procedure adopted by the panel. They are stated in Section 10 of this report and are in full agreement with the FCT guidelines on this matter.

Table 3: Recommendation for special programmatic funding

Items	*Grade*	*Amount*
Construction of certified climatic chamber, acquisition of modular steel profíles and dynamic actuators, and acquisition of measurement devices for the hydraulic flume	MSR	200,000 €
Hiring of researchers (Group 3, Geotechnics)	MSR	72,000 €

Panel members agree with the proposals for the use of this additional funding for equipment and with the schedule and performance expectations stated by the unit during the site visit.

The panel notes that the proposal summarised in Table 3 includes the strengthening of the experimental equipment presently available for the research in Hydraulics.

The panel recommends strongly the unit to submit to the next evaluation panel a project report on the developments and results obtained through this additional funding.

Appendix V
Report on CEC-UP

1. Introduction

In the evaluations held in 1996 and 1999, the research activity at the Department of Civil Engineering of University of Porto developed under a single and relatively large unit, CEDEC-UP. The overall research quality of the unit was graded as ***Good*** in both instances.

The evaluation reports stressed the difficulty of carrying quality research in rather poor working conditions and with experimental facilities that ranged from severely inadequate to barely sufficient. The organisation and the operation of this unit induced the impression that CEDEC-UP was a designation shared by independent and non co-ordinated groups, with very different levels in research motivation and options, that led to rather distinct performance indices in quality, productivity and international visibility. In order to improve its performance while ensuring the clear definition of missions, plans and strategies, the evaluation panel suggested in 1999 the possibility of splitting CEDEC-UP into coherent units.

This suggestion has been followed by the researchers of CEDEC-UP. They are now organised in four units, namely CEC-UP, combining the activities in Structures and Construction. LABEST-UP, a group that specialises in Concrete Structures, CEHRA-UP, that hosts the research in Hydraulics and Water Resources, and CITTA-UP, that operates in Territory and Transports. The latter two units assume a direct interaction with environmental issues.

CEC-UP is still a relatively large unit, involving thirty-five PhD researchers, as many as the total of the remaining three units. It is organised in eight groups, in a logic that is based on but not limited by subject matters. This led CEC-UP to separate Groups 2 (Modelling of Structures) and 3 (Vibrations and Monitoring of Structures), Groups 4 (Geotechnical Structures) and 5 (Polymeric Materials and By-Products), and Groups 6 (Hygrothermics and Building Physics) and 7 (Acoustics).

The facilities now in use in the new campus are of good quality, and supported by adequate library and computing services and equipment. As this improvement is very recent, its impact in the research activity is still limited and hindered by persisting

insufficiencies, namely in what regards essential experimental equipment and adequate support of technical staff.

As it is stressed below, the present form of organisation enhances the heterogeneity of the research out-put of the groups that form CEC-UP, as assessed by the number of doctoral theses and of publications in international archive journals and by the supporting funded research projects. Panel members stress, also, that they could not assess the performance of Group I (Mathematical Models), which should constitute a major and distinguishing strength of CEC-UP. It did not participate in the report and in the presentation. It was mentioned neither in the reports of the remaining groups nor in the presentation of their activities.

2. Unit Evaluation and Recommendations

A major improvement noted in the recent past is the increase in the number of national and international scientific meetings organised by CEC-UP and held at the new facilities. However, the unit seems conscious that it is sill relying too heavily on national research projects and on studies contracted locally.

The overall impression that CEC-UP gives is that it tries to dabble in too many research topics without being able to carry out its work in depth or in quality in a number of those topics. There is some excellent and original research being carried out by Groups 2, 3, 6 and 7. The work reported by Groups 4 and 5 is of high quality and of national excellence. The work of Group 8, on the other hand, is far too disparate and disjointed, lacking clear and well co-ordinated research objectives, judging from the way it has been reported and presented.

The ratios of PhD students and of international research projects per PhD staff member remain low. Doctoral programmes seem to remain excessively long, with CEC-UP assuming an average higher than ten years. The (low) average found for all units is of 0.11 PhD theses per PhD staff member and per year. For the last three-year period, the ratio for CEC-UP is 0.06, according to its report.

Particular reference needs to be made to the publishing record of CEC-UP, in both national and international archive journals. Groups 6 and 8 report no publications in the three-year period, although they involve nearly 30% of the permanent PhD staff members. Similarly, it is very weak the publishing performance in refereed journals of 40% of the permanent PhD staff members that form Groups 2 and 4.

The ratio of papers published in international journals per permanent PhD staff member per year (0.15) is substantially lower than the (low) average found for all units (0.35). The percentage of permanent PhD staff members that have not published in international journals over the three-year period is high (63%) and higher than the (high) average found (50%). The equivalent numbers found for permanent PhD staff members that published neither in national nor international journals are 43% and 35%, respectively.

The analysis of the publishing record shows that there is an urgent need for the unit as a whole to change the culture of publishing its research out-put, and greater efforts need to be made to publish in peer reviewed internationally reputed journals. Moreover, the Panel notes that researchers wrongly classify non-Portuguese but otherwise national publications as international archive journals.

There is a good argument for Groups 2 and 3 to join forces and mobilise thus the critical mass needed to take their work to greater heights. There is high quality and innovative work being carried out in these two groups, and there is much talent and expertise that is original and valuable to advance knowledge in their respective fields of research. There are also similar and strong arguments for Groups 4 and 5 to join forces. With the available testing facilities, it should be possible for the unit as a whole to develop more experimental work related to the different groups. The Panel notes that staff members stated that the present structure of the unit does neither prevent nor discourage internal co-operation, which remains effective between the groups mentioned above. However, this is not reflected in the research output, and it is likely to remain so if the present organisation is maintained.

In a unit of this size, regular internal meetings to evaluate and assess these aspects can lead to greater productivity and enable the groups to utilise their talents more effectively. The unit as a whole should critically evaluate its overall research objectives. It should have a more clearly focussed strategic goal; it should select collectively a reduced number of research topics; it should aim to achieve greater collaboration and co-ordination between the groups and with other research units, namely with ICIST-UTE.

CEC-UP stated clearly in its presentation that it is well aware of the weaknesses and strengths inherited from CEDEC-UP and that it is very much committed to change and to improvement. The unit should, therefore, engage soon the support of an Advisory Board and establish a close co-operation for the reassessment and identification of objectives, plans and strategies. A more clearly focussed research should enable the unit to establish and actively participate in international networks that would enhance the quality of its work. A clear distinction should be made between the topics where the unit wants to excel

and to reach an international level and those that correspond mainly to consulting service to the community.

3. Preliminary Evaluation

The preliminary evaluation is based on the analysis of the documentation submitted by the unit. As it is stated elsewhere, it is the opinion of the Panel that the structure of the report should be improved, to facilitate both its preparation and its interpretation.

Weaknesses particular to the CEC-UP report are the identification of effective forms of international co-operation, particularly in what concerns joint research projects. The definition of research objectives and of action plans can be too vague and general to be useful (for instance to Group 8) or completely inadequate (as in the case of Group 7). The identification of innovative aspects in the proposed activities is often unclear (e.g. Groups 2, 3 and 4), as well as of the supporting strategy (e.g. Groups 3 and 6).

The average grades of the Panel are summarised in Table 1. They range from 1 (Poor) to 5 (Excellent). The definition of the second item in Table 1, on Innovative Technological Prototypes and Patents, was interpreted differently by Panel members. The grades marked (n+)/(n^-) are affected by n marks above/below average by more than 1.5 points. The variations in the Preliminary Evaluation are very much induced by the structure and the quality of the report and by the disparity found in groups.

Table 1: Preliminary Evaluation

Results:	
Publications in major international journals	2.5
Innovative technological prototypes and patents (if applicable)	$2.3(1^+1^-)$
Supervising of post-graduate students and training	$3.0(1^-)$
Involvement of young researchers and/or post-docs	$2.3(1^-)$
Organisation of scientific meetings and regular seminars	$2.5(1^-)$

Relevance of the Research Activity:	
Breath and depth of ongoing and planned research activity	3.3
Current importance of the research themes	3.5
Multidisciplinary and relevance for of the research areas	2.8(1⁻)
Contribution to research activities in other institutions	3.0
Internationalisation - Quality and Quantity:	
Joint publications with foreign researchers	1.5
Participation in scientific and technological projects with foreign researchers	2.7(1⁻)
Interaction with foreign researchers and/or research units abroad	3.5

4. Site Visit Evaluation

The presentation of CEC-UP was well prepared and adequately delivered for the formal that has been chosen. The presentation would have been more effective by describing in less detail the current activities of the groups that form CEC-UP in benefit of a deeper analysis of their merits and limitations. This is important for a newly formed unit with the characteristics of CEC-UP, to a firm and clear standing in what regards mission, planning and strategy.

The visit to the experimental facilities was useful to confirm specific needs in equipment and to appraise the research under development. The direct interaction with staff members, during the visit to the facilities and after the presentation of CEC-UP, was generally lively and open.

The Panel valued the private interviews held with staff members, but regretted not being able to establish contact with all profiles requested, namely PhD members with no publications in international and/or national journals, students in the early stages of their MSc and PhD programmes, and recently graduated PhD staff members.

The average grades of the Panel are summarised in Table 2, where the same notation is used. Variations in the grades for Site Evaluation result from positions upheld by Panel members.

Table 2: Site Visit Evaluation

Intrinsic Merit of the Unit Activity:	
Goals, ongoing and planned projects, strategic development in the near future	3.0
Results obtained	2.8
Training of young researchers and students	3.0
Organisation of workshops, colloquia, periodic seminars	3.0
Interdisciplinary ventures	2.4
Interactions with other national and international research units, and companies	2.8
Knowledge and technology transfer, outreach activities	2.4
Altitudes and Work Environment::	
Adequacy of unit organisation and leadership	2.8
Culture of creativity and opportunity/encouragement of younger researchers initiative	3.2
Resources for the Research Activity	
Facilities	Good
Library - Journals	Good/Fair
Library - Books	Good/Fair
Equipment	Good
Technical support	Fair
Secretarial support	Fair
Funding	Fair/Good

5. Overall Research Unit Quality

The Panel graded CEC-UP as ***Good***. According to the criteria established for the evaluation, this means that, globally, research activities are at a fair international level and at a high national level, with publications in internationally well-known journals.

6. Special Programmatic Funding

The proposal for Special Programmatic Funding summarised in Table 3 and the recommendations given below result from the application of the criteria and procedure adopted by the panel. They are stated in Section 10 of this report and are in full agreement with the FCT guidelines on this matter.

Panel members agree with the proposals for the use of this additional funding for equipment and with the schedule and performance expectations stated by the unit during the site visit. The panel recommends strongly the unit to submit to the next evaluation panel a project report on the developments and results obtained through this additional funding.

Table 3: Recommendation for special programmatic funding

Items	*Grade*	*Amount*
Structural health monitoring equipment	MSR	100,000 €
Cyclic direct shear & upgrade of static/cyclic pullout test equipment	MSR	30,000 €
Two creep frames and clamps and strain reading devices	MSR	30,000 €
Geosynthetics hydraulic test devices	MSR	20,000 €
Hot box apparatus	MSR	98,000 €
Mercury porosimeter	MSR	45,000 €
Reverberation chambers (upgrade to 1 0 channels)	MSR	25,000 €
Three small rolling cranes	MSR	10,000 €
Three small rolling cranes	SR	25,000 €
Prestressing jacks, hydrauiic pump, logic controller, data acquisition	SR	50,000 €
Callibration chamber for evaluation of anisotropy	R	40,000 €
Equipment for physical tests on small samples	R	20,000 €
Data acquisition system for existing press	R	15,000 €
Equipment for systems and component testing	R	50,000 €

Appendix VI
Report on CEHIDRO-UTL

1. Introduction

The overall grading of CEHIDRO-UTL improved from Good to Very Good in the evaluations held in 1996 and 1999. This evolution recognised improvements in the balancing of research and applications and of numerical and physical modelling, and in the increase in activity in certain areas, namely in Hydrology. The 1999 report stressed the persisting weak performance in publications in international journals, and praised the organisation and the homogeneity of the unit and the scientific professionalism of its members.

The structure and the overall dimension of the staff of CEHIDRO-UTL remain basically the same. The unit involves nearly twenty PhD staff members, organised in five groups, namely Applied Hydrodynamics and Hydro-transients, Hydraulic Structures and Fluvial Systems. Maritime Hydraulics and Works, Environment and Water Resources, Water Quality and Pollution Control.

2. Unit Evaluation and Recommendations

CEHIDRO-UTL is one of the strongest research groups in Europe in Hydraulics, at University level. It is well known abroad, regularly involved in the organisation of international scientific meetings and is presently involved in forefront research issues, such as hydrologic trends associated to global changes, floods and dam risks.

The research work of Group A develops along two strong axes, namely water-hammer analysis-and dam-break risks, with complementary approaches and presents a good balance between fundamental topics and applied research, which benefit from specific original features. The research is developed at different levels and supported by an adequate spread of means, combining European Union contracts, international collaborations and national projects.

The objectives and planning of Group B suffer from a range of themes, from spillways to sediments and history of hydraulics, too spread for the total number of permanent staff members.

The activity of Group C seems to emphasise locally contracted consulting work. The problems and the issues are interesting but the tools used and the developments reported are weak in added knowledge. The work on Stochastic and Numerical Wave Modelling is emergent and suggests the development of stable forms of international collaboration.

It is difficult to assess the activity of the two remaining groups using the report they submitted. The planning of Group E is indistinct and that of Group D is fuzzy and does not identify specific, clear-cut work themes and contributions. Moreover, the international relations that are enumerated seem to correspond to contacts rather than to effective co-operation.

These two groups, by the very definition of their research titles, have a very important role to play nationally and internationally. The effects of global warming and of the current changes in climatology and environment on clean water resources and waste water management, for example, will have national, regional and international impact. They have thus a great opportunity to put themselves on the world map, provided they can agree on a realist set of co-operative research objectives and strategies.

The permanent staff members of CEHIDRO-UTL are strongly involved in the publication of books and book chapters and participate actively in both national and international scientific meetings. The performance index in publication in international archive journals is better than the average found for the units under evaluation. It is noted, however, its record shows a substantial heterogeneity in the distribution of this form of publication, both at individual and group levels, with Group C performing rather poorly.

According to the report of CEHIDRO-UTL, the ratio of papers published in international journals per permanent PhD staff member per year (0.40) is higher than the (low) average found for all units (0.35). The panel notes that researchers wrongly classify non-Portuguese but otherwise national publications as international journals. The percentage of permanent PhD staff members that have not published in international journals over the three-year period is high and close to the (high) average found (50%). The equivalent numbers found for permanent PhD staff members that published neither in national nor international journals are 20% and 35%, respectively.

At unit level, CEHIDRO-UTL should perform better in terms of participation in international research programs and networking, and its rate of production of doctoral theses per permanent PhD staff member is also low during the period in evaluation (0.16), but higher than the (low) average found for all units (0.11). The number of PhD students is relatively

low, but the working atmosphere for young researchers is positive, as it is their assessment of the support they receive from their supervisors.

The Panel strongly recommends CEHIDRO-UTL to encourage and support the development of its young PhD members. There could be an excessive involvement in consulting work and/or teaching duties, and insufficient opportunities for effective working-periods abroad. Like most units hosted by universities or departments longer established. CEHIDRO-UTL reports serious difficulties in engaging non-staff PhD members. Besides improving its local and national recruitment basis, CEHIDRO-UTL should invest decidedly in the engagement of foreign students, which is very much dependent on the quality of the international image of the unit, as defined through international co-operation and publishing.

CEHIDRO-UTL has the necessary conditions to secure a forefront position, nationally and internationally, in terms of research output of high quality papers and doctoral degrees. In terms of strategic management of research policy, and besides a commitment to strengthen an effective collaboration with CEHRA-UP and LNEC, CEHIDRO-UTL should take the necessary measures to improve the relative performance of its groups in terms of quality and quantity of research. CEHIDRO-UTL should, with the-support of its Advisory Board, select a reduced number of topics and set quantitative targets designed to attain and maintain leading positions at international level. Presently, this is very much dependent on the policy of the unit on the engagement and support young researchers.

3. Preliminary Evaluation

The preliminary evaluation is based on the analysis of the documentation submitted by the unit. As it is stated elsewhere, it is the opinion of the Panel that the structure of the report should be improved, to facilitate both its preparation and its interpretation.

Under its present framework, the report submitted by CEHIDRO-UTL is well prepared. Besides the weaknesses mentioned above on the reports submitted by Group D and, in particular, by Group E, the linkage between group objectives and the strategic objectives of the unit are not always clear, as in the case of Group A. The characterisation of projects is not sufficiently clear, as it is not clear the description of the different forms of international co-operation.

The average grades of the Panel are summarised in Table I. They range from 1 (Poor) to 5 (Excellent), with grade O identifying a non-applicable or a non-existing activity or item. The definition of the second item in Table 1, on Innovative Technological Prototypes and

Patents, was interpreted differently by Panel members. The grades marked $(n^+)/(n^-)$ are affected by n marks above/below average by more than 1.5 points. The variations in the Preliminary Evaluation are very much induced by the structure and the quality of the report, and by the disparity found in groups.

Table 1: Preliminary Evaluation

Results:	
Publications in major international journals	3.3
Innovative technological prototypes and patents (if applicable)	0.7
Supervising of post-graduate students and training	3.7
Involvement of young researchers and/or post-docs	2.8
Organisation of scientific meetings and regular seminars	3.8
Relevance of the Research Activity:	
Breath and depth of ongoing and planned research activity	3.5
Current importance of the research themes	3.8
Multidisciplinary and relevance for of the research areas	$2.3(1^-)$
Contribution to research activities in other institutions	2.5
Internationalisation - Quality and Quantity:	
Joint publications with foreign researchers	$2.8(1^-)$
Participation in scientific and technological projects with foreign researchers	3.2
Interaction with foreign researchers and/or research units abroad	3.2

4. Site Visit Evaluation

The visit was very well organised. The presentation of CEHIDRO-UTL was well prepared and adequately delivered for the format that has been chosen, and supported by posters and publications. The visit to the experimental facilities was useful to assess in-house capacity and to appraise the research under development.

The direct interaction with staff members was very useful and generally lively and open. The Panel valued the private interviews held with staff members with different profiles, namely students in the early stages of their MSc and PhD programmes, and recently graduated PhD staff members.

The Panel regrets not being able to meet with PhD staff members that did not publish in international and/or national journals during the period of the evaluation, as it was not made aware in due time of their availability.

The average grades of the Panel are summarised in Table 2, where the same notation is used. Variations in the grades for Site Evaluation result from positions upheld by Panel members.

Table 2: Site Visit Evaluation

Intrinsic Merit o f the Unit Activity:	
Goals, ongoing and planned projects, strategic development in the near future	3.4
Results obtained	3.2
Training of young researchers and students	3.2
Organisation of workshops, colloquia, periodic seminars	$3.0(1^-)$
Interdisciplinary ventures	$2.4(1^+)$
Interactions with other national and international research units, and companies	3.4
Knowledge and technology transfer, outreach activities	$3.2(1^-)$
Altitudes and Work Environment:	
Adequacy of unit organisation and leadership	3.6
Culture of creativity and opportunity/encouragement of younger researchers initiative	3.0
Resources for the Research Activity:	
Facilities	Good
Library - Journals	Good
Library - Books	Good
Equipment	Good/Fair
Technical support	Fair
Secretarial support	Fair/Good
Funding	Good/Fair

5. Overall Research Unit Quality

The panel graded CEHIDRO-UTL as ***Good/Very Good***. According to the criteria established for the evaluation, this means that, globally, research activities at a fair/good

international level and at a high national level with publications in internationally well-known/leading journals.

6. Special Programmatic Funding

The proposal for Special Programmatic Funding summarised in Table 3 results from the application of the criteria and procedure adopted by the panel. They are stated in Section 10 of this report and are in full agreement with the FCT guidelines on this matter. The panel recommends strongly the unit to submit to the next evaluation panel a project report on the developments and results obtained through this additional funding.

Table 3: Recommendation for special programmatic funding

Items	*Grade*	*Amount*
Hiring of researchers (Group A)	MSR	150,000 €
Hiring of researchers (Group B)	MSR	150,000 €

Appendix VII
Report on CEHRA-UP

1. Introduction

In the evaluations held in 1996 and 1999, the research activity at the Department of Civil Engineering of University of Porto developed under a single and relatively large unit, CEDEC-UP. The overall research quality of the unit was graded as Good in both instances.

The evaluation reports stressed the difficulty of carrying quality research in rather poor working conditions and with experimental facilities that ranged from severely inadequate to barely sufficient. The organisation and the operation of this unit induced the impression that CEDEC-UP was a designation shared by independent and non co-ordinated groups, with very different levels in research motivation and options, that led to rather distinct performance indices in quality, productivity and international visibility. In order to improve its performance while ensuring the clear definition of missions, plans and strategies, the evaluation panel suggested in 1999 the possibility of splitting CEDEC-UP into coherent units.

This suggestion has been followed by the researchers of CEDEC-UP. They are now organised in four units, namely CEC-UP, combining the activities in Structures and Construction. LABEST-UP, a group that specialises in Concrete Structures, CEHRA-UP, that hosts the research in Hydraulics and Water Resources, and CITTA-UP, that operates in Territory and Transports. The latter two units assume a direct interaction with environmental issues.

CEHRA-UP involves fourteen PhD researchers organised in four coherent groups, namely Coastal and Maritime Studies, Water Resources and Fluvial Hydraulics, Studies of the Urban Water Cycle and Experimental Fluid Mechanics.

The facilities now in use in the new campus are of good quality, and supported by adequate library and computing services and equipment. As this improvement is very recent, its impact in the research activity is still limited and hindered by persisting insufficiencies, namely in what regards essential experimental equipment and adequate support of technical staff.

The report and the presentation of CEHRA-UP projects, at this stage, the ambition to be a broad-based, national, applied unit, rather than one with a significant international presence. The major strength of this newly formed unit is the will and the lucidity shown to guarantee future progress through quality work. Also important is its awareness of the weaknesses it endures, namely a poor record in publications, a relatively high age average, and a strong involvement in non-research academic and external activities.

The performance of CEHRA-UP in terms of publications in international archive journals is poor. The number of PhD members that report publications in refereed journals is low, as it is low their rate of publication. It is stressed, however, that these publications are placed in the best journals of their particular area of interest.

According to the report submitted by the unit, the ratio of papers published in international journals per permanent PhD staff member per year is 0.08, the lowest found for all units and well below the (low) average found in this evaluation (0.35). The percentage of permanent PhD staff members that have not published in International journals over the three-year period is very high (85%), even when compared with the (high) average found (50%). The equivalent numbers found for permanent PhD staff members that published neither in national nor international journals are 85% and 35%, respectively.

In apparent contradiction with this form of performance is the rate reported in the production of doctoral theses during the period of the evaluation, where CEHRA-UP reports better than all other units. The ratio of PhD theses per permanent PhD staff members and per year (0.26) is substantially higher than the (low) average found (0.11). The number of non-PhD members involved in the activity of the unit is significant, and they have shown a high degree of motivation and enthusiasm in the contacts they established with the Panel members.

CEHRA-UP has been involved in the organisation of a significant number of national and international scientific meetings. However, the level of international co-operation reported by the unit is not substantive and does not reflect the bilateral initiatives that its areas of operation would suggest, namely in Water Resources and Fluvial Hydraulics.

As it has been stated above, the staff members of CEHRA-UP recognise these weaknesses in their report and its leader stated them clearly in the presentation. The Panel supports the implementation of the different measures disclosed in both instances to improve the research performance of the unit. However, the Panel stresses that such

measures should be coupled with a reduction in the number of research areas CEHRA-UP showed interest in maintaining active and in strengthening internal co-operation.

CEHRA-UP needs strengthening to underpin firm research leadership in the organisation and management of its research activity and of its research output. The Panel recommends regular meetings of group leaders to assess and evaluate the progress and attainment of targets in each group.

Provided that specific insufficiencies in equipment are solved. CEHRA-UP is now in the position to profit from good experimental and computing facilities, while counting on experienced researchers that can master sophisticated experimental equipment and numerical modelling tools. Thus, the Panel strongly recommends CEHRA-UP to revise its objectives and the supporting research plan and strategy to match the new possibilities, in close collaboration with CEHIDRO-UTL and LNEC. CEHRA-UP should reduce the number of non-academic and external activities, increase the experimental work where the unit could be excellent, invest in international co-operation by opening its facilities to foreign researchers and send its researchers abroad to widen their expertise and to develop a culture of international publication and co-operation.

3. Preliminary Evaluation

The preliminary evaluation is based on the analysis of the documentation submitted by the unit. As it is stated elsewhere, it is the opinion of the Panel that the structure of the report should be improved, to facilitate both its preparation and its interpretation.

Weaknesses particular to the CEHRA-UP report are the coherence of the strategic planning of the unit and of its groups, the absence of an action plan to support the commitment to improve and extend institutional co-operation, particular in what concerns national networking, the data on the budget of the projects listed, and. in general, but specially for Group 4 (Experimental Fluid Mechanics), the inadequacy of the definition of research objectives and activities.

The average grades of the Panel are summarised in Table 1. They range from 1 (Poor) to 5 (Excellent). The definition of the second item in Table 1, on Innovative Technological Prototypes and Patents, was interpreted differently by Panel members.

The grades marked $(n^+)/(n^-)$ are affected by n marks above/below average by more than 1.5 points. The variations in the Preliminary Evaluation are very much induced by the structure and the quality of the report, and by the disparity found in groups.

Table 1: Preliminary Evaluation Results:	
Results:	
Publications in major international journals	1.7
Innovative technological prototypes and patents (if applicable)	0.7
Supervising of post-graduate students and training	3.3
Involvement of young researchers and/or post-docs	2.7 ($1^{+}1^{-}$)
Organisation of scientific meetings and regular seminars	3.3
Relevance of the Research Activity:	
Breath and depth of ongoing and planned research activity	3.3
Current importance of the research themes	3.2
Multidisciplinary and relevance for of the research areas	2.0($1^{+}1^{-}$)
Contribution to research activities in other institutions	2.7 (1-)
Internationalisation - Quality and Quantity:	
Joint publications with foreign researchers	1.2
Participation in scientific and technological projects with foreign researchers	1.7
Interaction with foreign researchers and/or research units abroad	1.7

Table 2: Site Visit Evaluation

Intrinsic Merit of the Unit Activity:	
Goals, ongoing and planned projects, strategic development in the near future	2.6
Results obtained	2.0
Training of young researchers and students	3.0
Organisation of workshops, colloquia. periodic seminars	3.6
Interdisciplinary ventures	2.4 ($1^{+}1^{-}$)
Interactions with other national and international research units, and companies	2.6 (1^{-})
Knowledge and technology transfer, outreach activities	2.8 (1^{-})
Altitudes and Work Environment:	
Adequacy of unit Organisation and leadership	2.6
Culture of creativity and opportunity/encouragement of younger researchers initiative	2.6
Resources for the Research Activity:	
Facilities	Good
Library - Journals	Good/Fair
Library - Books	Good/Fair
Equipment	Good/Fair
Technical support	Fair
Secretarial support	Fair
Funding	Fair

4. Site Visit Evaluation

The presentation of CEHRA-UP was long and mostly based on text displays that could not be followed and which, in part, were not essential to the exercise. The Panel expected a

more firm and clear standing in what regards mission, planning and strategy, based on the self-assessment of the newly formed unit and on the reports of the previous evaluations of CEDEC-UP.

Leadership is clearly assumed, but, at the occasion, seemed to put more emphasis on sanctioning than on encouragement and enlivening. The interaction the Panel established with staff members, during the visit to the facilities and after the presentation of CEHRA-UP, was generally lively and open. The visit to the experimental facilities was useful to confirm specific needs in equipment, to appraise the research under development and the ability of the researchers.

The Panel valued the private interviews held with staff members, but regretted not being able to contact all profiles requested, namely PhD members with no publications in international and/or national journals, students in the early stages of their MSc and PhD programmes, and recently graduated PhD staff members.

The average grades of the Panel are summarised in Table 2, where the same notation is used. Variations in the grades for Site Evaluation result from positions upheld by Panel members.

5. Overall Research Unit Quality

The Panel graded CEHRA-UP as ***Good/Fair***. According to the criteria established for the evaluation, this means that, globally, research activities are at a fair international level and at a high/fair national level with publications only partially in internationally well-known journals

6. Special Programmatic Funding

The proposal for Special Programmatic Funding summarised in Table 3 and the recommendations given below result from the application of the criteria and procedure adopted by the panel. They are stated in Section 10 of this report and are in full agreement with the FCT guidelines on this matter.

Table 3: Recommendation for special programmatic funding

Item	*Grade*	*Amount*
System for water channel and wave tank	MSR	300.000 €
Particle image velocimeter	MSR	100. 000 €
System for water channel and wave tank	SR	15.000 €
Particle image velocimeter	SR	92.000 €
Laser Doppler anemometer	SR	176.000€
Oscilloscope	R	10.000 €

Panel members agree with the proposals for the use of the additional funding for equipment and with schedule and performance expectations stated by the unit during the site visit. A project report on the developments and results obtained through this additional funding must be submitted to the next evaluation panel.

Appendix VIII
Report on CESUR-UTL

1. Introduction

CESUR-UTL is the longer established of all units under assessment. CESUR-UTL specialises in systems engineering, transport and urban and regional planning. It was frequently used as an example of a successful university based research centre, because of the quality and dynamism of its staff and the impact their work had nationally and, in some instances, internationally.

The 1996 evaluation report recognised that CESUR-UTL still led in many of the areas at national level but suggested a weakening impact both nationally and internationally. This report identifies strong activities in Transport Systems and in Operational Research, notes that more emphasis was being placed on applications than on the fundamental development of new theories, and calls on the improvement on international and multidisciplinary co-operation and in internal interaction.

This latter aspect is raised in the 1999 unit report and stressed in the global evaluation report. The 1999 evaluation distinguishes again the research performance in Operational Research and Systems Engineering and considers that all other areas address practical problems o f the consulting type rather than research activity. This evaluation maintained the 1996 grade of ***Good*** for the overall research quality of the unit.

Presently, CESUR-UTL has thirteen permanent PhD staff members organised in four groups, namely Operational Research and Systems Engineering, Transport and Transport Infrastructure, Spatial Dynamics and Environment, and Housing and Urban Planning.

2. Unit Evaluation and Recommendations

The research of the four groups that form CESUR-UTL is of a great diversity, as assessed by the number of doctoral theses and of publications in international archive journals and by the supporting funded research projects. The present evaluation recognises that CESUR-UTL has reported a noticeable upsurge in purely academic activity, apart from its consulting-level production, which remains substantial.

The performance in terms of doctoral theses per PhD staff member and per year is good (0.2) and substantially higher in all groups than the (low) average found in this evaluation, which is close to the performance reported by Group 4 (0.1 1). The corresponding index on publications in international journals yields a value (0.45) higher than the (low) average found (0.35), again with Group 4 lagging significantly.

The Panel notes that researchers wrongly classify non-Portuguese but otherwise national publications as international journals. According to the report submitted by CESUR-UTL, nearly half of its PhD members did not publish in international journals, a number that is close to the (high) average found for all units, and as many did not submit Communications to scientific meetings during the period under evaluation.

The percentage of permanent PhD staff members that have published neither in national nor in international journals (30%) is slightly lower than the (low) average found (35%). Less than a quarter of the PhD staff members of CESUR-UTL reach good indices of publication in that period, with obvious exceptions that present a high and sustained level of scientific publications. Similar situations have been detected in other units under evaluation.

The Panel notes that the numbers that support theses indices in the report can be substantially different from those provided in the presentation. This conflicting information extends to different areas. For instance, the report mentions a significant number of relevant international projects that are not listed as ongoing projects of the unit. They should not be mentioned in the report if they are promoted by a distinct entity.

The research activity remains strong in Group 1. The indices are good, also, for the results reported by Groups 2 and 3, which represents a substantial improvement on the results reported in 1999. The research performance of Group 4 is lower, and the activity reported specifically in area the are of Transport Infrastructure within Group 2 is also weak.

In what regards the support to doctoral theses over the three-year period under evaluation, the ratio of PhD theses produced per PhD staff member and per year is higher (0.18) than the (low) average found (0.11). A very positive development in the practice of CESUR-UTL is the involvement of PhD students in its activity, thus proving that it has overcome a major weakness identified in the evaluation held in 1996, when its activity was sustained mostly by MSc dissertations. This positive evolution has been reported in the 1999 evaluation, indicating a well-sustained effort of the unit to increase the quality of the research in depth and breadth.

However, and as it is stated in the same evaluation report, neither the report nor the presentation of CESUR-UTL proved convincingly a substantive collaboration between groups and a strong interaction of Group I with the remaining groups. The common root and the distinguishing problem-oriented systemic approach may persist in all groups, but the presentation suggested to Panel members the notion that Group I could exist as an independent unit and to others that it might be functioning that way. It would not be totally unfair to extend this impression to the remaining groups or sub-groups. Of course this might not be the case, and it will certainly not be in the future, as the members of CESUR-UTL stressed their commitment to the planned reorganisation the unit is going through.

CESUR-UTL has a wealth of inter-disciplinary expertise, cutting across traditional approaches to research activity. There are several areas where the expertise of the unit can contribute to research activities typical to civil engineering, namely solid waste management and sustainable management of water resources. A third area is Transport Infrastructure. The opportunities for innovative inter-disciplinary research are enormous.

The lasting impression of CESUR-UTL is that of a unit with very valuable assets, namely its historical very strong background and the proven talent of its leading members, is going through a continuing and very appreciated process of reassessment of mission, improvement of organisation and strategic planning. This effort will enable CESUR-UTL to keep or even strengthen its standing as an institution of reference in its main areas of operation, provided that it succeeds in balancing adequately its research and consulting activities.

3. Preliminary Evaluation

The preliminary evaluation is based on the analysis of the documentation submitted by the unit. As it is stated elsewhere, it is the opinion of the Panel that the structure of the report should be improved, to facilitate both its preparation and its interpretation.

Given the nature of CESUR-UTL, the Panel did not expect the inadequacies found in the planning of the activity of some groups and in the definition of objectives and strategies. The Panel recommends CESUR-UTL to submit the report in due time and to ensure the consistency of the information provided there and in the presentation of the unit.

The average grades o f the Panel are summarised in Table 1. They range from 1 (Poor) to 5 (Excellent). The definition of the second item in Table 1, on Innovative Technological Prototypes and Patents, was interpreted differently by Panel members. The grades marked $(n^+)/(n^-)$ are affected by n marks above/below average by more than 1.5 points.

The variations in the Preliminary Evaluation are very much induced by the structure and the quality of the report, and the disparity found in groups.

Table 1: Preliminary Evaluation Results:

Results:	
Publications in major international journals	3.2
Innovative technological prototypes and patents (if applicable)	2.2 (1^-)
Supervising of post-graduate students and training	3.5
Involvement of young researchers and/or post-docs	3.3 (1^-)
Organisation of scientific meetings and regular seminars	2.0
Relevance of the Research Activity:	
Breath and depth of ongoing and planned research activity	3.5
Current importance of the research themes	3.5
Multidisciplinary and relevance for of the research areas	2.7 (1^-)
Contribution to research activities in other institutions	2.8 (2^-)
Internationalisation - Quality and Quantity:	
Joint publications with foreign researchers	2.5 (1^-)
Participation in scientific and technological projects with foreign researchers	3.0 (1^-)
Interaction with foreign researchers and/or research units abroad	3.2 (1^-)

Table 2: Site Visit Evaluation

Intrinsic Merit of the Unit Activity:	
Goals, ongoing and planned projects, strategic development in the near future	3.2
Results obtained	3.2
Training of young researchers and students	3.4
Organisation of workshops, colloquia. periodic seminars	2.0
Interdisciplinary ventures	2.8
Interactions with other national and international research units, and companies	3.2 (1^-)
Knowledge and technology transfer, outreach activities	3.0 (1^-)
Altitudes and Work Environment:	
Adequacy of unit Organisation and leadership	3.0
Culture of creativity and opportunity/encouragement of younger researchers initiative	3.2
Resources for the Research Activity:	
Facilities	Good
Library - Journals	Good
Library - Books	Good
Equipment	Good
Technical support	Fair/ Good
Secretarial support	Fair/ Good
Funding	Good

4. Site Visit Evaluation

The presentation of CESUR-UTL was very good, certainly better than most of the other presentations, and well supported by posters and publications. The direct interaction with staff members was generally lively and enriching, particularly in the clarification of conflicting matters, as raised in the report and in the presentation. The Panel valued the

private interviews held with students in the early stages of their MSc and PhD programmes, and with recently graduated PhD members. The Panel appreciated the availability of PhD members with no publications in international and/or national journals.

The average grades of the Panel are summarised in Table 2, where the same notation is used. Variations in the grades for Site Evaluation result from positions upheld by Panel members.

5. Overall Research Unit Quality

The panel graded CESUR-UTL as ***Good/Very Good***. According to the criteria established for the evaluation, this means that, globally, research activities at a fair/good international level and at a high national level with publications in internationally well-known/leading journals.

6. Special Programmatic Funding

The proposal for Special Programmatic Funding summarised in Table 3 and the recommendations given below result from the application of the criteria and procedure adopted by the panel. They are stated in Section 10 of this report and are in full agreement with the FCT guidelines on this matter.

Table 3: Recommendation for special programmatic funding

Items	*Grade*	*Amount*
Equipment for transport laboratory	MSR	50.000 €
Hiring of researchers	MSR	100.000 €

A project report on the developments and results obtained through this additional funding must be submitted to the next evaluation panel.

Appendix IX
Report on CIEC-UC

1. Introduction

The report of the evaluation held in 1996 strongly recommended CIEC-UC to define a common strategy and to orient and broaden the research themes toward modern, quality problems motivated through a higher involvement in International co-operation, while preserving the existing links with the local and regional communities.

Evolution in this direction is recognised in the report of the evaluation held in 1999. It recognised, also, an improvement in productivity in terms of results of general interest and of papers in international journals, graded as very poor in 1996. This evolution led to an overall grade improvement from ***Good/Fair*** to ***Good***.

During the course of the period under evaluation, CIEC-UC moved into new facilities, which are of good quality and supported by adequate library and computing services and equipment. The experimental facilities are also of good quality and the equipment has been strengthened using the special programmatic funding allocated to the unit in 1999, although specific insufficiencies are persisting.

The structure and the overall dimension of the staff of CIEC-UC remain the same. The unit involves now nine PhD staff members, organised in four groups, namely Geotechnics, Transport-Infrastructure. Transport-Mobility and Spatial Planning, and can count on a good ratio of young researchers per permanent PhD staff member.

2. Unit Evaluation and Recommendations

The objectives and plans for development stated in the report are ambitious, but it is not clear that they can be accomplished with the current strength of the research group. Moreover, the research themes seem excessively oriented to immediate applications, which limits the work of the unit in terms of significant and original contributions. Consequently, the impact of the group as a whole is not very impressive.

The 1999 report called for an improved internal co-ordination and co-operation, as implied by the matrix arrangement that supports the organisation of CIEC-UC. This has not been achieved fully, as it seems that is centred in its current leader. The leadership of the unit is

strong and dynamic and polarises most of the existing forms of international exchange and co-operation, which predominantly constitute exchanges of ideas.

The activity of CIEC-UC seems to concentrate on two major research areas, namely Geotechnics and Spatial Planning. However, the level of activity in these two areas is different, in benefit of the latter, Difficulty in access to adequate equipment seems to hinder the activity of researchers in Geotechnics, while, on the other hand, the group seems to produce a research not as sophisticated as the existent equipment allows for.

The unit reports an average of one doctoral thesis per year. The rate of PhD theses per PhD staff member and per year reported by CIEC-UC (0.08) is low and below the (low) average found (0.11). It is similar, and even better in some instances, than that found in other units. It is stressed, however, that this rate is still low for a unit involving nearly eight permanent PhD staff members during the period in evaluation.

The number of nationally funded research projects has stabilised, while the number of locally contracted projects and studies is still relatively high and mostly designed to cultivate the local and regional insertion of the unit and to strengthen the budget of the unit. The number of international projects remains small, particularly those with European Union funding, and the record of CIEC-UC as organiser and host of national and international scientific meetings remains unimpressive and without due justification.

A great proportion of the research is published in scientific meetings without due control of the originality of the work. The quality and the rate of publication in international archive journals have improved but remains at a level below of its capacity. Moreover, the Panel notes that researchers wrongly classify non-Portuguese but otherwise national publications as international journals.

The rate of papers published in international journals per permanent PhD staff member per year (0.33) is close to the (low) average found for all units (0.35). The percentage of permanent PhD staff members that have not published in international journals over the three-year period is high (close to 40%) but still below the (high) average found (50%). The equivalent numbers found for permanent PhD staff members that published neither in national nor international journals are 25% and 35%, respectively.

The Transport Infrastructure, Transport Mobility and Spatial Planning Groups should consider the benefits of merging into one group. This would require adaptation and reorientation of the research preferences and research activities of its members, who should identify areas where their expertise can be pooled, co-ordinated and strengthened

to support each other. in order to maximise their academic integration and research output.

CIEC-UC should give serious and critical thinking to develop a coherent and homogeneous research unit with a critical mass and the complementary technical experience to yield the capability and the opportunity for excellence in performance at national and international levels. There is the need for more positive and active planned interaction and collaboration between the research groups. Their expertise across disciplines should be clearly established and exploited with the purpose of gaining a specific strategic advantage, for instance in environmental research, in order to mobilise to greater benefit the good expertise and talent of its permanent staff members.

The Panel could not recognise in- CIEC-UC an upward momentum as strong as that reported in the evaluation held 1999. The unit has stabilised in many ways, which may translate a necessary consolidation, but it should seek the support of an international Advisory Board and focus on setting and achieving strategic research goals.

3. Preliminary Evaluation

The preliminary evaluation is based on the analysis of the documentation submitted by the unit. As it is stated elsewhere, it is the opinion of the Panel that the structure of the report should be improved, to facilitate both its preparation and its interpretation.

Weaknesses particular to the CIEC-UC report are the characterisation of its publications and of its participation in the organisation of scientific meetings, and the Identification of effective forms of international co-operation, particularly in what concerns joint research projects.

Table 1: Preliminary Evaluation Results:

Results:	
Publications in major international journals	3.3
Innovative technological prototypes and patents (if applicable)	1.0 (1^{+})
Supervising of post-graduate students and training	3.3
Involvement of young researchers and/or post-docs	2.5
Organisation of scientific meetings and regular seminars	2.8
Relevance of the Research Activity:	
Breath and depth of ongoing and planned research activity	3.3
Current importance of the research themes	3.2
Multidisciplinary and relevance for of the research areas	2.7 (1^{-})
Contribution to research activities in other institutions	2.5
Internationalisation - Quality and Quantity:	
Joint publications with foreign researchers	2.8 ($1^{+}1^{-}$)
Participation in scientific and technological projects with foreign researchers	2.2
Interaction with foreign researchers and/or research units abroad	2.7 (1^{-})

Table 2: Site Visit Evaluation

Intrinsic Merit of the Unit Activity:	
Goals, ongoing and planned projects, strategic development in the near future	3.0
Results obtained	2.8
Training of young researchers and students	3.0
Organisation of workshops, colloquia. periodic seminars	2.6
Interdisciplinary ventures	3.2
Interactions with other national and international research units, and companies	3.0
Knowledge and technology transfer, outreach activities	3.2
Altitudes and Work Environment:	
Adequacy of unit Organisation and leadership	3.2 (1^{+})
Culture of creativity and opportunity/encouragement of younger researchers initiative	3.4
Resources for the Research Activity:	
Facilities	Good
Library - Journals	Good/Fair
Library - Books	Good/Fair
Equipment	Fair/ Good
Technical support	Fair
Secretarial support	Fair
Funding	Fair

The average grades of the Panel are summarised in Table 1. They range from 1 (Poor) to 5 (Excellent). The definition of the second item in Table 1, on Innovative Technological Prototypes and Patents, was interpreted differently by Panel members.

The grades marked (n^+)/(n^-) are affected by n marks above/below average by more than 1.5 points. The variations in the Preliminary Evaluation are very much induced by the structure and the quality of the report, and by the disparity found in groups.

4. Site Visit Evaluation

The presentation of CIEC-UC was one of the best of all the presentations the Panel attended, both in content and in form. It was concise and objective, with well balanced and well designed graphic support. The visit to the experimental facilities was useful to confirm specific needs in equipment, as well as to appraise the research under development.

The Panel valued the interviews held with staff members, but regretted that it could neither hold these talks in due privacy nor establish contact with all profiles requested, namely PhD members with no publications in international and/or national journals, students in the early stages of their MSc and PhD programmes, and recently graduated PhD staff members.

The average grades of the Panel are summarised in Table 2, where the same notation is used. Variations in the grades for Site Evaluation result from positions upheld by Panel members.

5. Overall Research Unit Quality

The panel graded CIEC-UC as ***Good***. According to the criteria established for the evaluation. this means that, globally, research activities are at a fair international level and at a high national level, with publications in internationally well-known journals.

6. Special Programmatic Funding

The proposal for Special Programmatic Funding summarised in Table 3 and the recommendations given below result from the application of the criteria and procedure adopted by the panel. They are stated in Section 10 of this report and are in full agreement with the FCT guidelines on this matter.

Table 3: Recommendation for special programmatic funding

Items	*Grade*	*Amount*
Instrumented vehicle	MSR	78,000€
Hiring of researchers	MSR	72.000€
Hiring of researchers	SR	72,000 €
Tensile testing machine	SR	90,000 €
Resonant column	SR	30,000€
Gyratory shear compactor	SR	50,000€
High-capacity sieve shaker	SR	10.000€

It is the opinion of panel members that the new tensile testing machine should not be restricted to geomaterials. Its use should ensure a co-ordinated work with the group of CEC-UP working on polymer materials.

Panel members agree with the proposals for the use of this additional funding for equipment and with the schedule and performance expectations stated by the unit during the site visit.

The panel recommends strongly the unit to submit to the next evaluation panel a project report on the developments and results obtained through this additional funding.

Appendix X
Report on CIEC-UNL

CIEC-UNL is a newly formed unit that has applied to join the group of Civil Engineering units sponsored by FCT. It is hosted by the Department of Civil Engineering of New University of Lisbon.

After establishing the fundamental means and competence for teaching, university-based units start developing and expanding their research activity to reach the third stage of establishing a structured research unit with appropriately defined mission, objectives, planning and strategy.

CIEC-UNL is in the transition from the second into the third stage of this process of evolution, with the relative advantage of involving institutional members selected in the local industry.

The unit is relatively well served in facilities and staffed by eight permanent PhD unevenly spread in four groups covering not yet fully integrated areas, namely Structural Behaviour and Modelling, Structural Mechanics, Recuperation of Ancient Buildings and Concrete and Masonry Structures.

CIEC-UNE did not present an English version of its report. The report submitted is very weak in planning and a too vague in the definition of mission, objectives and strategy. The data summarised and given in the presentation of the unit indicates a moderate performance in terms of the quality, dimension and relevance of projects and its production of post-graduate these is still residual.

The performance of CIEC-UNL in published research results is weak. Over 60% of its permanent staff members did not publish in international or national refereed journals in the three-year period, which is perhaps the worst ratio found in all units. Moreover, the researchers of CIEC-UNL wrongly classify non-Portuguese but otherwise national publications as international journals.

Although the dimension of the unit is small, its members try to cover a too-wide range of areas and topics. The topics enumerated by the unit seem to be chosen by the prospect of funding, rather then by their strategic importance for the scientific or industrial community in a broad sense.

Permanent staff members have different training pró files, which may become an asset of CIEC-UNL. and different origins, ranging from existing to recently discontinued research units. The report and the presentation indicate that. at the present stage. CIEC-UNL is a combination of groups without a jointly assumed goal, plan or strategy.

The Panel pondered the possibility of recommending the unit to maintain its present status and to strengthen its performance by reinforcing the co-operation of its members with units already established.

However, Panel members recognised the experience and the talent of a core of researchers, their high motivation and good insertion, and chose to support the application of CIEC-UNL with an entering grade of ***Good/Fair***. According to the criteria established for the evaluation, this means that, globally, research activities are fair international level and at a high/fair national level with publications in/only partially in internationally well-known journals.

This decision may induce false expectations, which the Panel has no intention to create. The Panel considers that the starting basis of CIEC-UNL is sufficiently sound but that it faces a difficult challenge in its evolution into becoming a well-performing unit in the near future.

The number of permanent PhD staff members in Groups 2, 3 and 4 is well below the critical threshold which can produce competitive academic output in terms of both high quality publications and publishable post-graduate theses. The Panel strongly recommends the unit members to give top consideration as to how they intend to develop themselves into viable academic groups before they settle down into a structure which might later on prove to be not the best. Academically integrated groups with complementary expertise would allow the unit and its groups to flower and develop from year to year.

In order to become competitive in the academic world, CIEC-UNL should seek a larger critical mass, normally by attracting PhD students, and invest in fundamental and applied research based on its own expertise. This activity should support but not serve or be conditioned by a fruitful relationship with the industrial community.

The Panel recommends strongly CIEC-UNL to secure the support of an Advisory Board in the definition of the organisation of the unit, of its mission and of the objectives, plans and strategies, by weighing its strengths and weaknesses and attending to its insertion in the national network of research units.

Appendix XI
Report on CITTA-UP

1. Introduction

In the evaluations held in 1996 and 1999, the research activity at the Department o f Civil Engineering of University of Porto developed under a single and relatively large unit, CEDEC-UP. The overall research quality of the unit was graded as ***Good*** in both instances.

The evaluation reports stressed the difficulty of carrying quality research in rather poor working conditions and with experimental facilities that ranged from severely inadequate to barely sufficient. The organisation and the operation of this unit induced the impression that CEDEC-UP was a designation shared by independent and non co-ordinated groups, with very different levels in research motivation and options, that led to rather distinct performance indices in quality, productivity and international visibility. In order to improve its performance while ensuring the clear definition of missions, plans and strategies, the evaluation panel suggested in 1999 the possibility of splitting CEDEC-UP into coherent units.

This suggestion has been followed by the researchers of CEDEC-UP. They are now organised in four units, namely CEC-UP, combining the activities in Structures and Construction. LABEST-UP, a group that specialises in Concrete Structures, CEHRA-UP, that hosts the research in Hydraulics and Water Resources, and CITTA-UP, that operates in Territory and Transports. The latter two units assume a direct interaction with environmental issues.

CITTA-UP is a small unit involving seven PhD researchers thinly spread in five groups, namely Planning and Environmental Assessment, Urban Planning and Housing, Transport Planning and Logistics, Traffic Analysis and Management and Transport Systems.

The facilities now in use in the new campus are of good quality, and supported by adequate library and computing services and equipment. As this improvement is very recent. its impact in the research activity is still limited and hindered by persisting insufficiencies, namely in what regards adequate support of technical staff.

An important strength of CITTA-UP is the substantial number of young researchers that participate in its activities. The group leader is strong and dynamic and has a reputation at the European level, but the impact of the group as a whole is less impressive.

The five groups that form CITTA-UP are involved in very many, probably too many, separate research priorities. The expected synergies resulting from the combination of Planning and Transport groups are not yet visible. Moreover, the Transport Systems group does not appear well connected into the strategic direction of the unit.

The activity of CITTA-UP seems to concentrate on a major research area. Urban Sustainability/with some interesting research themes linked to the historical heritage of Porto. The other research areas reported are similar to those practised by similar research groups, with the relative disadvantage that original approaches and contributions could not be detected in the documentation submitted by CITTA-UP and were difficult to establish in the exchanges established with its staff members.

The assessment of the research products reported by the unit and the contacts established with its staff members suggested to Panel members that CITTA-UP is a regional, applied unit, which has recently built a substantial capacity in GIS tools, thus gaining a paramount position in the local consulting market. The possibility of using GIS to foster more theoretical research or even building up on international exchanges should be encouraged.

CITTA-UP has already developed a relatively good set of links with other European researchers with good standing, which should be exploited in the coming period. Although the unit is yet to attain a significant international presence, its participation in two European Union funded projects attests the strength of at least one group of the unit.

The performance level of the unit in the organisation of scientific meetings is weak. Equally weak is its record in the three-year period on the support to doctoral theses. Very weak is the record on publications in international archive journals, at both unit and individual levels. It seems that the participation in European Union funded projects has not been followed by subsequent publications. The number of PhD members that report publications in refereed journals is unacceptably low. It is noted, however, that they tend publish regularly.

The report submitted by CITTA-UP yields a rate of papers published in international journals per permanent PhD staff member per year (0.10) well below to the (low) average found for all units (0.35). The percentage of permanent PhD staff members that have not

published in international journals over the three-year period is high (close to 85%) is significantly higher than the (high) average found (50%). The equivalent numbers found for permanent PhD staff members that published neither in national nor international journals are 43% and 35%, respectively. The rate of production of doctoral theses per permanent PhD staff member is also low during the period in evaluation (0.05), the lowest found in all units, well below the (low) average found (0.11).

CITTA-UP is well established academically and has secured a continuous source of income through a series of locally contracted projects. Policy decisions have to be taken on an adequate balancing of academic and non-academic exploits, weighing the costs of eventually relinquishing advisory positions in the planning field, at local regional and national levels. However, this conflict is not unique to CITTA-UP. It has been present in other units, namely those operating in the same area of activity.

The number of permanent PhD staff members in each group is well below the critical threshold that can produce any academic impact on the international scene. Indeed, this is reflected in the very weak record of the unit on publications and post-graduate theses, as described in the unit report.

This dispersion and the fact that there are only two major recognisable disciplines in the overall structure of the unit, Planning and Transport, suggest the recommendation that CITTA-UP should consider seriously the possibility of reorganising the unit in two groups. Members of staff would have to compromise but, in compensation, they will have the opportunity to develop and mould traditional research into new, innovative and motivating inter-disciplinary partnership, to produce visible and measurable high quality academic research output in the next three years.

The Panel believes in the research assets of CITTA-UP, and strongly recommends the unit to revise its objectives and the supporting research plan and strategy, by engaging soon and working closely with a supporting international Advisory Board, while building on its close and successful relation with the city and the region of Porto.

3. Preliminary Evaluation

The preliminary evaluation is based on the analysis of the documentation submitted by the unit. As it is stated elsewhere, it is the opinion of the Panel that the structure of the report should be improved, to facilitate both its preparation and its interpretation.

Weaknesses particular to the CITTA-UP report are the definition of objectives, which seem to be independent of time, the formulation of the three-year planning, and the description of the involvement of young researchers and of its contribution to other institutions. The Panel recommends CITTA-UP to ensure the consistency of the information provided in the report and in the presentation of the unit.

The average grades of the Panel are summarised in Table 1. They range from 1 (Poor) to 5 (Excellent). The definition of the second item in Table 1, on Innovative Technological Prototypes and Patents, was interpreted differently by Panel members. The grades marked (n+)/(n$^-$) are affected by n marks above/below average by more than 1.5 points. The variations in the Preliminary Evaluation are very much induced by the structure and the quality of the report, and the disparity found in groups.

Table 1: Preliminary Evaluation Results:

Results:	
Publications in major international journals	1.7 (1$^+$)
Innovative technological prototypes and patents (if applicable)	1.0 (1$^+$)
Supervising of post-graduate students and training	3.2
Involvement of young researchers and/or post-docs	1.8 (1$^-$)
Organisation of scientific meetings and regular seminars	1.8
Relevance of the Research Activity:	
Breath and depth of ongoing and planned research activity	3.2 (1$^+$)
Current importance of the research themes	3.2 (1$^-$)
Multidisciplinary and relevance for of the research areas	2.3 (1$^+$1$^-$)
Contribution to research activities in other institutions	2.3 (1$^+$1$^-$)
Internationalisation - Quality and Quantity:	
Joint publications with foreign researchers	1.7 (1$^+$1$^-$)
Participation in scientific and technological projects with foreign researchers	3.2 (1$^+$)
Interaction with foreign researchers and/or research units abroad	2.3 (1$^+$1$^-$)

4. Site Visit Evaluation

The presentation of CITTA-UP was well delivered and well balanced, considering the dimension and the scope of the activity of the unit. The Panel expected a more firm and clear standing in what regards mission, planning and strategy, based on the self-assessment of the newly formed unit and on the reports of the previous evaluations of CEDEC-UP.

The direct interaction with staff members, after the presentation and during the visit to the facilities of CITTA-UP, was generally lively and open. The Panel valued the private interviews held with staff members: PhD members with no publications in international and/or national journals; students in the early stages of their MSc and PhD programmes, and; recently graduated PhD staff members.

The average grades of the Panel are summarised in Table 2, where the same notation is used. Variations in the grades for Site Evaluation result from positions upheld by Panel members.

Table 2: Site Visit Evaluation

Intrinsic Merit of the Unit Activity:	
Goals, ongoing and planned projects, strategic development in the near future	2.6
Results obtained	3.0(1^+)
Training of young researchers and students	3.0
Organisation of workshops, colloquia. periodic seminars	2.4
Interdisciplinary ventures	2.4
Interactions with other national and international research units, and companies	3.0
Knowledge and technology transfer, outreach activities	3.0
Altitudes and Work Environment:	
Adequacy of unit Organisation and leadership	3.4
Culture of creativity and opportunity/encouragement of younger researchers initiative	3.0
Resources for the Research Activity:	
Facilities	Good/Fair
Library - Journals	Good/Fair
Library - Books	Good/Fair
Equipment	Good/Fair
Technical support	Fair
Secretarial support	Fair
Funding	Good/Fair

5. Overall Research Unit Quality

The Panel graded CITTA-UP as ***Good/Fair***. According to the criteria established for the evaluation, this means that, globally, research activities are at a fair international level and at a high/fair national level with publications only partially in internationally well-known Journals

6. Special Programmatic Funding

The proposal for Special Programmatic Funding summarised in Table 3 and the recommendations given below result from the application of the criteria and procedure adopted by the panel. They are stated in Section 10 of this report and are in full agreement with the FCT guidelines on this matter.

Table 3: Recommendation for special programmatic funding

Items	*Grade*	*Amount*
Hiring of researchers (Group 1)	MSR	72.000 €
Internationalisation of MSc course	MSR	28.000 €

The additional funding allocated to the MSc course in Planning is intended to strengthen is integration at European level and to support the exchange o f students. Moreover, the panel recommends conditioning this additional funding to the reorganisation of the unit in the lines suggested in this report, and recommends strongly the unit to submit to the next evaluation panel a project report on the developments and results obtained through this additional funding.

Appendix XII
Report on ICIST-UTL

1. Introduction

The report of the evaluation held in 1996 praised the academic environment and acknowledged in general the ability and the motivation of the permanent staff and the quality, relevance and balance of the research topics and the insertion of the unit in both the national and the international research communities.

The report stressed, also, substantial distortions in performance at two levels, namely between Structures and Construction and between numerical modelling and experimental research, noted insufficiencies in group co-ordination and called for a clear definition of a strategy for development.

The same grade was awarded in the evaluation held in 1999. The report identifies improvements in internal communication and stresses further the insufficiencies in the research in Construction and the persisting limitations in technical staff. This evaluation maintained the 1996 grade of ***Very Good*** for the overall research quality of the unit.

ICIST-UTL remains the largest of the units under evaluation, involving sixty permanent PhD staff members. They are organised in eight groups covering a very wide range of subjects, namely Earthquake Engineering and Seismology, Structural Mechanics, Mathematics and Computational Methods, Studies in Construction, Bridges, Special Structures and Geotechnics, Structural Analysis, Reinforced and Prestressed Concrete Structures, Information and Design Support Systems and Architecture.

2. Unit Evaluation and Recommendations

The assets of ICIST-UTL are a strong tradition, a core of very qualified researchers and the very good computational and experimental facilities that serve the unit. The research developed in certain fields is recognised internationally. Although a substantial part of the permanent staff of ICIST-UTL seems to concentrate in servicing, at local, regional and national levels, most of the contracted projects listed in the report do not reflect particularly high-levels in technology transfer.

The organisation of ICIST-UTL in research groups does not look logical. For instance, in Group 4 Geotechnics is a subpart of a strange combination with Bridge Design and Steel Structures, with no apparent co-operation being reported. On the other hand, the separation between Groups 2 and 5 is unexpected. Additionally, a substantial Structural Analysis component is present also in Group 1, while other topics seem to be shared by several groups, for example Seismic Consequences. Also unclear is why should ICIST-UTL host Group 7, and eventually Group 8, and not a different unit, namely CESUR-UTL.

Each group seems to act as an independent entity, although there are overlapping topics, activities, and interests. This is very clear in the research plan submitted by ICTST-UIL, which is a non-integrated sum of separate and different quality plans, unsupported by objectives and strategies defined at unit level.

The plans submitted by Groups 2, 5. 7 and 8 are well written and contain original ideas, while those submitted by Groups 1, 3, 4 and 6 lack of preciseness, are too general and unsupported by research strategy, which is clearly stated in the plan of Group 5. Group 3 presents a very long list of very diverse research topics, which may strengthen the negative tendency reported in the previous evaluations. The plan of Group 6 also lists a substantial number of topics investigated by other research groups without clarifying the original contributions that are expected. A similar comment applies to the newly formed Group 8. The plan submitted by Group 7 emphasises Consulting work, with interesting projects, but it does not appear to encourage research.

ICIST-UTL has a long tradition of very good research in Civil Engineering and it remains well connected internationally, in different forms, namely in bilateral projects and in international organisations and committees, and at substantially different levels across the research groups. However, its international presence has decayed, as measured in the number of European Union research contracts and in the organisation of scientific meetings.

The substantial increase in the activity of ICIST-UTL in locally contracted consulting projects, as measured from its proportion in the funding of the unit, has not been accompanied by a similar development in the research activity. In fact, research performance indices have receded, in absolute terms in some cases and in relative terms in other, considering the increase in the number of permanent PhD staff registered in the period under evaluation.

ICIST-UTL remains involved in a substantial number of MSc programmes, which have increased significantly. However, the number of PhD programmes, which support in-depth

research, has stabilised. The ratio of PhD theses per year and per PhD staff member reported by the unit in the three-year period is low (0.09) and below the (low) average (0.11) found to for the units under evaluation. The Panel notes that post-graduate students in their first year expressed their satisfaction and enthusiasm in being able to have close interaction with their supervisors.

A sharp increase is reported in the number of Communications to scientific meetings, but the increase in the number of publications in international and national journals is marginal. The ratio of publications in international journals per year and per PhD staff member has remained stable and close to 0.40, slightly higher than the (low) average found for all units (0.35).

The numbers given above are distributed unevenly at group level and, also, within some groups. The Panel stresses, also, that researchers wrongly classify non-Portuguese but otherwise national publications as international journals. According to the report submitted by ICIST-UTL and using its classification for national and international journals, over 40% of the permanent PhD staff members of ICIST-UTL did not publish in international journals over the three year period, and nearly 30%o published neither in national nor in international journals over the same period. The (high) averages found for this measure of performance are 50% and 35%o, respectively.

ICIST-UTL reports difficulties in both administrative and technical support. Like most units hosted by universities or departments longer established, ICIST-UTL reports also difficulties in engaging non-staff PhD members. Besides improving its local and national recruitment basis, ICIST-UTL should invest decidedly in the engagement of foreign students, which is very much dependent on the quality of the international image of the unit, as defined through international co-operation and publishing. It seems, however, that most sources of weakness in terms of performance as a research unit are internal. They derive mainly from the option of being a large unit, covering a wide variety of fields and combining fundamental and applied research with a strong presence in consulting.

There is evidence of considerable disparity and imbalance in the goals set by each group and in the overall research activities and research output of the different groups. Further, the Panel could not notice a global vision for the unit as a whole, and there appears to have been no effort made to integrate and present a unified goal. The groups and the unit need more clearly defined and focused strategic goals and research activities, and question the laissez-faire policy that seems to characterise ICIST-UTL.

There is a need for ICIST-UTL to make an in-depth and critical examination of its activities and overall targets, and possibly of the present structure and organisation of the groups vis-à-vis the unit. ICIST-UTL should seek the support of its Advisory Board to address urgent and important issues, namely the balance and the effect of its outreach activities in its performance in research at both national and international levels, and the coherence of its present organisation. Besides the improvement in internal co-operation and information, it is the Panel opinion that this eventual reorganisation should enhance the creation of international clusters around specific themes and provide a basis for participation in international networks of excellence. In short, ICIST-UTL should reassess its mission and identify clearly its objectives, plans and strategies and regroup or divide accordingly.

3. Preliminary Evaluation

The preliminary evaluation is based on the analysis of the documentation submitted by the unit. As it is stated elsewhere, it is the opinion of the Panel that the structure of the report should be improved, to facilitate both its preparation and its interpretation.

Under its present framework, the report submitted by ICIST-UTL is well prepared. Among the points raised above, the major weakness of the report is its presentation as a collection of non co-ordinated and non-integrated parts. Moreover, the characterisation of projects is not sufficiently clear, as it is not clear the description of the forms of international co-operation.

The average grades of the Panel are summarised in Table 1. They range from 1 (Poor) to 5 (Excellent). The definition of the second item in Table 1, on Innovative Technological Prototypes and Patents, was interpreted differently by Panel members.

Table 1: Preliminary Evaluation Results:

Results:	
Publications in major international journals	3.5
Innovative technological prototypes and patents (if applicable)	1.3 (1^+)
Supervising of post-graduate students and training	2.5
Involvement of young researchers and/or post-docs	2.8
Organisation of scientific meetings and regular seminars	3.5
Relevance of the Research Activity:	
Breath and depth of ongoing and planned research activity	3.7
Current importance of the research themes	3.2 (1^-)
Multidisciplinary and relevance for of the research areas	3.3
Contribution to research activities in other institutions	3.2
Internationalisation - Quality and Quantity:	
Joint publications with foreign researchers	3.2 (1^-)
Participation in scientific and technological projects with foreign researchers	3.7
Interaction with foreign researchers and/or research units abroad	3.7

The grades marked (n^+)/(n^-) are affected by n marks above/below average by more than 1.5 points. The variations in the Preliminary Evaluation are very much induced by the structure and the quality of the report, and the disparity found in groups.

4. Site Visit Evaluation

The visit was very well organised. The presentation of ICIST-UTL was well prepared for the format that has been chosen, and supported by posters and publications. It is noted, however, that the oral presentation of the work of the unit was not especially strong and that the information presented about different groups was uneven. The visit to the experimental facilities was useful to assess in-house capacity and to appraise the research under development.

The direct interaction with staff members was very useful and generally lively and open. The Panel valued the private interviews held with staff members with different profiles, namely students in the early stages of their MSc and PhD programmes, and recently graduated PhD staff members.

The Panel regrets not being able to meet with PhD staff members that did not publish in international and/or national journals during the period of the evaluation.

The average grades of the Panel are summarised in Table 2, where the same notation is used. Variations in the grades for Site Evaluation result from positions upheld by Panel members.

Table 2: Site Visit Evaluation

Intrinsic Merit of the Unit Activity:	
Goals, ongoing and planned projects, strategic development in the near future	3.5
Results obtained	4.0
Training of young researchers and students	3.3
Organisation of workshops, colloquia. periodic seminars	3.0
Interdisciplinary ventures	2.3
Interactions with other national and international research units, and companies	3.5
Knowledge and technology transfer, outreach activities	3.3
Altitudes and Work Environment:	
Adequacy of unit Organisation and leadership	3.8
Culture of creativity and opportunity/encouragement of younger researchers initiative	3.5
Resources for the Research Activity:	
Facilities	Good
Library - Journals	Good
Library - Books	Good
Equipment	Good/Fair
Technical support	Fair
Secretarial support	Fair
Funding	Good/Fair

5. Overall Research Unit Quality

The panel graded ICIST-UTL as ***Very Good/Good***. According to the criteria established for the evaluation, this means that, globally, research activities are at a good/fair

international level and at a high national level with publications in internationally leading/well-known journals.

6. Special Programmatic Funding

The proposal for Special Programmatic Funding summarised in Table 3 results from the application of the criteria and procedure adopted by the panel. They are stated in Section 10 of this report and are in full agreement with the FCT guidelines on this matter.

Table 3: Recommendation for special programmatic funding

Items	*Grade*	*Amount*
Hiring of researchers (Group 1)	MSR	80,000 €
Hiring of researchers (Group 2)	MSR	80,000 €
Hiring of researchers (Group 5)	MSR	80,000 €
Hiring of researchers (Group 6)	MSR	40.000 €
Hiring of researchers (Group 7)	MSR	40.000 €

The panel recommends strongly the unit to submit to the next evaluation panel a project report on the developments and results obtained through this additional funding.

Appendix XIII
Report on ITPC-UC

1. Introduction

The report of the evaluations held in 1996 and in 1999 characterised ITPC-UC as a heterogeneous and weakly co-ordinated and organised combination of young and highly motivated researchers. Their strong will to emerge was hampered by a policy of covering a too broad spectrum of research topics and further conditioned by the relatively poor working conditions and research facilities used by unit.

The improvements that justified the evolution of the global grading from ***Fair/Good*** to ***Good*** over that period were a greater focus placed in publication in international archive journals, a better rate in the production of doctoral theses, a more substantial engagement in national and international research programs.

ITPC-UC moved into new facilities during the course of the period under evaluation. They are of good quality and supported by adequate library and computing services and equipment. The experimental facilities are also of good quality and the equipment has been strengthened s using the special programmatic funding allocated to the unit in 1999, although specific insufficiencies are persisting.

The structure and the overall dimension of the staff of ITPC-UC remain the same. The unit involves now nearly twenty PhD staff members, organised in four groups, namely Construction, Steel and Composite Construction, Mechanics of Materials and Concrete Structures.

2. Unit Evaluation and Recommendations

The Panel shares the opinion expressed in the 1999 report on the rather artificial separation that persists in the groups that form ITPC-UC. Moreover, it notes that the heterogeneity in the indices of performance noted in the previous reports has deepened during the period under evaluation.

The ratio of young researchers per permanent PhD staff member is relatively low at unit level, as it is the rate of doctoral theses produced per year and per PhD researcher reported by ITPC-UC (0.13), but slightly higher than the (low) average found for all units

(0.11). However, and according to the sequence used above, Groups 1 and 2 perform well in this respect, with Group 3 showing no activity. This pattern extends to the organisation and hosting of national and international scientific meetings, where ITPC-UC performs relatively well at national level.

The performance indices on publication in international archive journals vary widely. The index is very low for Group 3 and below average for Group 4. The performance of Group 2 is good, both in number and in the selection of international archive journals. The number reported by Group 1 is disproportionate and reveals a policy of publishing variations in modelling, in journals that cannot be rated as first-rank. Moreover, the Panel notes that researchers in different groups wrongly classify non-Portuguese but otherwise national publications as international journals.

At unit level, the rate of papers published in international journals per permanent PhD staff member per year (0.63) is well above the (low) average found for all units (0.35). The percentage of permanent PhD staff members that have not published in international journals over the three-year period is high (close to 45%) but below the average found (50%). The percentage is the same for permanent PhD staff members that published neither in national nor international journals, higher than the average found (35%).

The level of participation of ITPC-UC in international research projects remains low. Its performance in terms of nationally funded research projects is good, while the number of locally contracted projects and studies is still relatively high. Following the comments above on the global research performance of ITPC-UC, the Panel is led to the conclusion that this type of activity is causing losses in internationally competitive research, which do not compensate the direct and indirect rewards of serving closely the local and regional communities.

A positive development in the research practice of ITPC-UC, which has also been noticed in other units under evaluation, is a progressive integration in research of numerical modelling with experimental testing. The Panel notes, however, that less experienced researchers may not have ensured the co-operation of specialists to attain the necessary levels of reliability and cost effectiveness in the design of both facilities (Group 1) and experiments (Group 4).

The working atmosphere for young researchers is positive and their assessment of the support they receive from their senior supervisors is positive. Thus, group leadership seems to be a bonus, particularly in Group 1.

The present organisation of ITPC-UC should be reconsidered, as it has been an obstacle to group co-ordination and may have enhanced the high degree of heterogeneity in performance that presently characterises the unit. There is persisting lack of coherence in the choice of research topics across the groups and even within certain groups. Moreover, the industrial relevance of some topics is doubtful.

In order to become competitive at international level, ITPC-UC, as a unit, and its individual groups should reduce in number and in diversity the research topics listed in the report and in the presentation of the unit, and establish a coherent relationship in the development of strategic topics shared by different groups.

The unit as a whole needs to examine its research critically, and organise them in a more positive and beneficial way. The Panel strongly recommends ITPC-UC to seek the support of an Advisory Board and focus on setting and achieving strategic research goals, and to abandon soon the laisser-faire policy assumed by the unit during this evaluation.

3. Preliminary Evaluation

The preliminary evaluation is based on the analysis of the documentation submitted by the unit. As it is stated elsewhere, it is the opinion of the Panel that the structure of the report should be improved, to facilitate both its preparation and its interpretation.

The quality of the report submitted by ITPC-UC is poor, with confusing information on publications and research contracts budgeting. Moreover, the research strategy of the unit is not adequately explained more explicitly, and the definition of research objectives and the description of research plans can be too general and to vague, as in the case o f Group 3 (Mechanics of Materials).

The average grades of the Panel are summarised in Table 1. They range from 1 (Poor) to 5 (Excellent). The definition of the second item in Table 1, on Innovative Technological Prototypes and Patents, was interpreted differently by Panel members.

The grades marked (n+)/(n^-) are affected by n marks above/below average by more than 1.5 points. The variations in the Preliminary Evaluation are very much induced by the structure and the quality of the report, and by the disparity found in the groups.

Table 1: Preliminary Evaluation Results:

Results:	
Publications in major international journals	3.7
Innovative technological prototypes and patents (if applicable)	0.8 (1^{+})
Supervising of post-graduate students and training	3.0
Involvement of young researchers and/or post-docs	3.0
Organisation of scientific meetings and regular seminars	3.8
Relevance of the Research Activity:	
Breath and depth of ongoing and planned research activity	2.7 (1^{-})
Current importance of the research themes	2.3 (1^{-})
Multidisciplinary and relevance for of the research areas	2.0 (1^{-})
Contribution to research activities in other institutions	2.3
Internationalisation - Quality and Quantity:	
Joint publications with foreign researchers	2.2
Participation in scientific and technological projects with foreign researchers	2.0
Interaction with foreign researchers and/or research units abroad	2.2

Table 2: Site Visit Evaluation

Intrinsic Merit of the Unit Activity:	
Goals, ongoing and planned projects, strategic development in the near future	2.4
Results obtained	3.2
Training of young researchers and students	3.6
Organisation of workshops, colloquia. periodic seminars	2.8
Interdisciplinary ventures	2.2
Interactions with other national and international research units, and companies	2.8 (1^{-})
Knowledge and technology transfer, outreach activities	2.8
Altitudes and Work Environment:	
Adequacy of unit Organisation and leadership	2.4
Culture of creativity and opportunity/encouragement of younger researchers initiative	3.8
Resources for the Research Activity:	
Facilities	Good
Library - Journals	Good/Fair
Library - Books	Good/Fair
Equipment	Fair/Good
Technical support	Fair
Secretarial support	Fair
Funding	Fair/Good

4. Site Visit Evaluation

The presentation of ITPC-UC was weak, both in form and in content. It was produced as the result of the combination on a common format of the information provided by independent groups. No mention was made to the definition of mission, plans and strategies, as a result of a self-assessment of the recent past of the unit.

The visit to the experimental facilities was useful to confirm specific needs in equipment, as well as to appraise the research under development and the experimental expertise of staff members. The direct interaction established during this visit and after the presentation of the unit was generally lively and open.

The Panel valued the interaction established with researchers and the interviews held with staff members with different profiles: PhD members with no publications in international and/or national journals; students in the early stages of their MSc and PhD programmes, and; recently graduated PhD staff members.

The average grades of the Panel are summarised in Table 2, where the same notation is used. Variations in the grades for Site Evaluation result from positions upheld by Panel members.

5. Overall Research Unit Quality

The panel graded ITPC-UC as ***Good***. According to the criteria established for the evaluation, this means that, globally, research activities are at a fair international level and at a high national level, with publications in internationally well-known journals.

6. Special Programmatic Funding

The proposal for Special Programmatic Funding summarised in Table 3 and the recommendations given below result from the application of the criteria and procedure adopted by the panel. They are stated in Section 10 of this report and are in full agreement with the FCT guidelines on this matter. Groups 1 and 2 identify the Construction and Steel and Composite Construction Groups, respectively.

Table 3: Recommendation for special programmatic funding

Items	*Grade*	*Amount*
Furnace and supporting equipment	MSR	160.000€
Hiring of post-doc researcher (Group 1)	SR	42.000€
Hiring of post-doc researcher (Group 2)	R	42,000€
Structural monitoring equipment	R	155,000€
Two climatic chambers	R	150,000€

The panel recommends strongly the unit to submit to the next evaluation panel a project report on the developments and results obtained through this additional funding. Particular care should be taken to ensure the efficient use of the climatic chambers, and to avoid, in particular, the development of studies with limited practical relevance, as it is frequently the case of small-scale studies. The panel would most strongly support a Fire Research Laboratory, eventually located at ITPC-UC, provided that this infrastructure is used by all groups involved, in a well co-ordinated manner. This type o f infrastructure is expensive to set up, run and maintain, and so are fully instrumented fire tests. It should be dimensioned to accommodate not only full size elements but also structural joints if the full benefits of fire resistant design are to be derived. It should be staffed by a multi-disciplinary team, providing expertise in Material Science, Structural Mechanics and Structural Modelling.

Appendix XIV
Report on LABEST-UP

1. Introduction

In the evaluations held in 1996 and 1999, the research activity at the Department of Civil Engineering of University of Porto developed under a single and relatively large unit, CEDEC-UP. The overall research quality of the unit was graded as ***Good*** in both instances.

The evaluation reports stressed the difficulty of carrying quality research in rather poor working conditions and with experimental facilities that ranged from severely inadequate to barely sufficient. The organisation and the operation of this unit induced the impression that CEDEC-UP was a designation shared by independent and non co-ordinated groups, with very different levels in research motivation and options, that led to rather distinct performance indices in quality, productivity and international visibility. In order to improve its performance while ensuring the clear definition of missions, plans and strategies, the evaluation panel suggested in 1999 the possibility of splitting CEDEC-UP into coherent units.

This suggestion has been followed by the researchers of CEDEC-UP. They are now organised in four units, namely CEC-UP, combining the activities in Structures and Construction. LABEST-UP, a group that specialises in Concrete Structures, CEHRA-UP, that hosts the research in Hydraulics and Water Resources, and CITTA-UP, that operates in Territory and Transports. The latter two units assume a direct interaction with environmental issues.

LABEST-UP is a single-group, highly coherent small unit, involving nine PhD researchers with complementary backgrounds. Although they would fit well and strengthen the area of operation of CEC-UP, their option for autonomy has been openly assumed as necessary to maintain the spirit and to enhance the momentum of the group.

The facilities now in use in the new campus are of good quality, and supported by adequate library and computing services and equipment. As this improvement is very recent, its impact in the research activity is still limited and hindered by persisting insufficiencies, namely in what regards essential experimental equipment and adequate support of technical staff.

2. Unit Evaluation and Recommendations

The research and development objectives of the unit are well defined, realistic and supported by a sound strategy of combining specialists in material science and in numerical modelling. The proposed topics of research are relevant but not different from those selected by similar groups, with the exception of topic on the use of industrial by-products and waste materials in building and civil engineering.

The rate of doctoral theses produced per year and researcher is low, but identical to the average found for all units (0.11). It is noted that most of the researchers have been educated and trained locally. This is not necessarily negative but a more widespread, international background tends to improve the quality of the groups and to enhance their levels of effective international co-operation.

The performance in terms of papers in international journals is close to the (low) average found to all units (0.35 papers per PhD staff member and per year), but it drops substantially

(to 0.15) when the papers pending for publication are not accounted for. It is noted that, in this case, 44% of the permanent PhD researcher did not publish in international journals in the three-year period, while a residual part (close to 10%) published neither in national nor in international journals. The average number found is 35%.

Besides increasing the basis of publishing (most papers are authored by the same researcher) and investing further in promoting internationally the results of its research, LABEST-UP should give particular attention to the development of effective forms of international research co-operation, the current level of which is below its proven abilities.

As all other sources of weakness that have been identified are external, namely in research equipment and funding, the Panel has no motive to recommend internal changes. The report and the presentation of LABEST-UP and the interaction established with its members evidence an upward momentum and project the image of a well integrated and co-ordinated team, with young, talented and dynamic researchers, that interact and value mutual strengthening.

The combination of materials, analysis, design and construction is to be highly commended. and provides the unit the opportunity to develop an holistic approach to civil engineering. The unit has a sound view on how consulting can contribute to applied research, while aware of the advantages of distributing the various sources of funding.

The unit is aware of its strengths and weaknesses, and is able to address them in a positive manner to go forward and achieve greater heights. It is sensibly focused and targeted, and the support of the Advisory Board will provide the confidence necessary to manage its potential growth.

3. Preliminary Evaluation

The preliminary evaluation is based on the analysis of the documentation submitted by the Unit. As it is stated elsewhere, it is the opinion of the Panel that the structure of the report should be improved, to facilitate both its preparation and its interpretation.

The strategic planning is not adequately presented in the report submitted, and the references to joint organisation of post-graduate courses and to increased participation in national and European Union projects are insufficiently supported. A similar comment applies to the reference made to additional advanced research equipment, both in type and in purpose.

The average grades of the Panel are summarised in Table 1. They range from 1 (Poor) to 5 (Excellent). The definition of the second item in Table 1, on Innovative Technological Prototypes and Patents, was interpreted differently by Panel members. The grades marked $(n^+)/(n^-)$ are affected by n marks above/below average by more than 1.5 points. The variations in the Preliminary Evaluation are very much induced by the structure and the quality of the report.

4. Site Visit Evaluation

The presentation of LABEST-UP was well prepared and adequately delivered for the format that has been chosen. The Panel believes, however, that the time spent in the presentation of current activities should have been used to extend and deepen the contacts with staff members and to discuss in more detail the mission, planning and strategy of the unit.

The visit to the experimental facilities was useful to confirm specific needs in equipment and to appraise the research under development. The direct interaction with staff members was very useful and generally lively and open. The Panel valued the private interviews held with some staff members of LABEST-UP with the profiles required in due time.

The average grades of the Panel are summarised in Table 2, where the same notation is used. Variations in the grades for Site Evaluation result from positions upheld by Panel members.

Table 1: Preliminary Evaluation Results:

Results:	
Publications in major international journals	3.2
Innovative technological prototypes and patents (if applicable)	0.7 (1^{+})
Supervising of post-graduate students and training	3.3
Involvement of young researchers and/or post-docs	2.3 ($1^{-}2^{+}$)
Organisation of scientific meetings and regular seminars	2.7
Relevance of the Research Activity:	
Breath and depth of ongoing and planned research activity	3.2
Current importance of the research themes	3.2
Multidisciplinary and relevance for of the research areas	1.8 (1^{-})
Contribution to research activities in other institutions	3.2($1^{-}1^{+}$)
Internationalisation - Quality and Quantity:	
Joint publications with foreign researchers	1.7 (2^{-})
Participation in scientific and technological projects with foreign researchers	3.0 (1^{-})
Interaction with foreign researchers and/or research units abroad	2.7 (1^{-})

Table 2: Site Visit Evaluation

Intrinsic Merit of the Unit Activity:	
Goals, ongoing and planned projects, strategic development in the near future	3.8
Results obtained	3.4
Training of young researchers and students	3.4
Organisation of workshops, colloquia. periodic seminars	3.0
Interdisciplinary ventures	2.6 (1^-)
Interactions with other national and international research units, and companies	2.8 (1^-)
Knowledge and technology transfer, outreach activities	2.8 (1^-)
Altitudes and Work Environment:	
Adequacy of unit Organisation and leadership	4.0
Culture of creativity and opportunity/encouragement of younger researchers initiative	3.8
Resources for the Research Activity:	
Facilities	Good
Library - Journals	Good
Library - Books	Good
Equipment	Good
Technical support	Fair/Good
Secretarial support	Fair
Funding	Fair/Good

5. Overall Research Unit Quality

The panel graded CESUR-UTL as ***Good/Very Good***. According to the criteria established for the evaluation, this means that, globally, research activities at a fair/good international level and at a high national level with publications in internationally well-known/leading journals.

6. Special Programmatic Funding

The proposal for Special Programmatic Funding summarised in Table 3 and the recommendations given below result from the application of the criteria and procedure adopted by the panel. They are stated in Section 10 of this report and are in full agreement with the FCT guidelines on this matter.

Table 3: Recommendation for special programmatic funding

Items	*Grade*	*Amount*
Control system for existing MTS stations	MSR	60,000 €
Optic signal acquisition system	MSR	47.000 €
Climatic aging chamber	MSR	75,000 €
Concrete rheometer	MSR	60,000 €
Hydraulic power and actuator (400 tons)	MSR	48,000 €
Hydraulic power and actuator (400 tons)	SR	102,000 €

Panel members agree with the proposals for the use of this additional funding for equipment and with schedule and performance expectations stated by the unit during the site visit.

The panel recommends strongly the unit to submit to the next evaluation panel a project report on the developments and results obtained through this additional funding.