

Professor Edmundo Monteiro
Director of CISUC
Universidade de Coimbra
Portugal

5th February 2013

Dear Professor Monteiro

I am sending an updated version of the report from CISUC's Advisory Board.

The attached document constitutes the Advisory Board's review of the CISUC activities during 2011. It should be noted that the report is a compilation of several partial reports, addressing both the center and its research groups, produced by the members of the Advisory Board.

The CISUC workshop, held in 17 September was much helpful for a deeper understanding of CISUC activities and dynamics as it provided a rich source of information that complemented what has been provided in the 2011 report.

Yours sincerely

A handwritten signature in black ink, appearing to read 'João Alvaro Carvalho', written in a cursive style.

João Alvaro Carvalho

CISUC Advisory Board composition:

- Pedro Barahona, Universidade Nova de Lisboa, PT
- João Alvaro Carvalho, University of Minho, PT - Chair
- Carlos Cotta, University of Malaga, Spain
- David Hutchison, University of Lancaster, UK
- Johan Karlsson, Chalmers University of Technology, Sweden
- José Carlos Príncipe, University of Florida, USA

Introduction

This report has been produced to respond to the request of CISUC to its Advisory Board.

The Advisory Board is expected to provide, on a regular basis, external advice to the center. In order to fulfill its mission the Advisory Board should analyze CISUC annual plans and reports, and visit the center.

This report is based on the 2011 report produced by CISUC, complemented by information and impressions collected during the workshop organized by CISUC and held on September 17, 2012, in Coimbra (Workshop program in Annex).

Pedro Barahona, Universidade Nova de Lisboa, Pt

This report was prepared based on the information provided by the 2011 report of the CISUC, complemented with information obtained during the CISUC workshop that took place in Coimbra, on 17 September 2012. I will first present an overall opinion on the centre as a whole, before providing a more detailed review on the Cognitive and Media Systems group.

First, and as a general impression on the CISUC as a whole, I found that it presents a quite good overall balance between fundamental and applied research (stronger in the latter), a very good level of funding and publication record, and a quite good level of internationalization. The structure of the centre is tightly related to the expertise of its host department (the Computer Science department of the FCT/UC) rather than any deliberate choice, but this is common in these research centres. The various groups in CISUC present different strengths and weaknesses (as apparent in the specific reports), but all seem to present a problem (common in Portuguese institutions) of attracting PhD students, despite of the level of funding in projects.

This is not the case with researchers: although the core of CISUC is on the Department of Computer Science, a significant number of researchers are from other institutions in the Coimbra (and centre of Portugal) area, and some with positions abroad. It has also established good connections with other research centres and institutions in Coimbra, namely in the medical domain, that show evidence of being quite successful.

I will now focus the attention to the Cognitive and Media Systems group. The rest of this report follows the structure of the previous report regarding 2010 to make it easy to compare the activity in these years and acknowledge its evolution of the CMS group.

Scope and Internal Structure

The research of the group covers a number of topics where cognitive functions are used in varying degree to improve systems with a strong media component, and identified Human Computer Confluence (HCC) as a unifying theme for a variety of research topics. The group aligns its strategy with some areas defined by the European Union, namely the EU FP7 ICT mainly in challenges 2 and 4, and in particular in topics of Cognitive Systems, Language Technologies, Symbiotic Interaction and Technology-Enhanced Learning.

The group maintains its structure of 4 main research streams, namely i) AmILab: Ambient Intelligence; ii) CCDMLab: Computational Creativity and Digital Media; iii) ETLab: Educational Technology, and iv) KISLab: Knowledge and Information Systems.

Comment: The scope of the CMS group is quite varied and encompasses a number of topics that are somewhat loosely related. It is easier to see commonalities between some activities of the CMS and other groups (well illustrated in the talks of PhD students of the CMS and ECOS groups on different aspects of "evolution") than between different activities within the CMS group (e.g. between Aesthetic Evaluation and Transportation Planning). Nevertheless, this apparent *ad hoc* structure is not a liability if the different groups collaborate at the level of CISUC, at least by sharing experiences. I believe this is done informally both in CISUC and in the host Department of Computer Science, but no organised activity of this kind is mentioned in the 2011 report (it was briefly discussed in the CISUC workshop).

Members

The report (as last years' report) does not mention the number of members of the CMS Research Group. The slides presented at the CISUC Workshop, mention 17 full members, but many of them are not members of the Computer Science Department. More important although full members, it is not clear whether they are researchers in full time, which makes it difficult to assess whether the productivity of the group (measured in indicators such as the number of publications or the funding attracted by member).

Comment: As stated in the last review, it is understandable that a researcher carries work in several groups and streams but an approximate number of "equivalent full time" researchers should definitely be available. The lack of such a number makes it difficult to fully evaluate the group productivity. Assuming the number of 17 full members and that their availability for research is about half-time I will use the number of 8 full-time researchers for the CMS group.

PhDs

The number of PhDs is mentioned to be 30 (in the slides) and the number of finished PhDs has increased to 2 (from none in the years of 2008 and 2009, to one in 2010).

Comment: Assuming a 4-year duration of a PhD and a total of 8 full members of the CMS group, a quite reasonable number of PhDs (for Portuguese standards) would be 8-16 PhD students in activity and 2-4 finished PhDs per year. This interval (its lower bound) was indeed obtained this year but it is hard to assess whether this is sustainable, since no reliable number of PhD students were available (for example in the CISUC workshop it was clear that the PhD counting presented in the slides of the CMS group (30) and in the opening of CISUC (55) was not consistent). It would be convenient to have a statistic of current PhD students, with the time they have been in the PhD programme.

Publications

In 2011, the CMS group has significantly improved its record of publications, when compared to 2010. As is common in Computer Science, publications are mostly aimed at (peer-reviewed) conferences. 8 journal articles were published in 2011 journals (3 in 2010), but its quality was mixed: 2 papers were published in an A journal (but in the area of Medicine) and 1 paper in a B journal in Computer Science (the others were not ranked in the ERA study of 2010).

As to papers presented in conferences and published in their proceedings, their overall quality, whilst improving with respect to 2010, is not yet in a sufficiently good level. From the 63 publications referred to in the report, and discounting the journal papers and 1 book chapter, only count 49 Proceeding papers are listed in the report (apparently 5 publications went unaccounted for). This is an increase in quantity compared with last year (only 26) but not so much in quality. From the 49 papers, only 5 were published in A conferences (2 as posters, 3 in a conference in the area of Biomedical Engineering) and 8 in B conferences, which compares with 9 A and 3 B conference papers in 2010. of which in A ranked conferences, and 3 in B conferences.

Clearly, the group should aim at more important conferences in the area of Computer Science, although it should be praised the quality of the publications arisen from joint research with the medical and biomedical areas.

Funding

Like in 2010, the figures presented in the report (and in the slides) are hard to interpret. The figures presented in the initial section seem to refer to the full funding of the projects, neither the 2011 funding nor the component of funding to the CISUS team.

This type of presentation should clearly be improved; otherwise no sound judgement can be made on this topic. Qualitatively, it looks like one FP7 project has finished (in the workshop a new project starting in 2012 was mentioned) and no new projects have started in 2011. Still, the level of funding seems very good. On the negative side, it relies very much on Portuguese funding, which is likely to decrease in the near future, and should thus be complemented with European and other international funding.

Other Achievements

The report shows that (notwithstanding the quality of the venues, mentioned above) the peer-recognised internationalization of the group remains at a quite high level, measured not only in the number and quality of publications (and citations) and the funding that was obtained, but also membership in editorial boards, steering committees and programme committees of several events and publications, a number of awards in their publications, and international evaluation of projects.

Conclusion

In my view the CMS group of CISUC presented a quite good record of activity in 2011 and, although the weak and strong points mentioned in the comments above are very much aligned with last year's, shows a clear improvement over 2010.

CISUC

The overall impression from both the report and the workshop is quite positive. The information provided concerning aspects such as number of researchers, projects, publications, funding, etc., suggests a dynamic research centre with strong competences in the computing area.

I would like to stress the increase in the number of publications, especially in journal articles. It seems to exist a strong involvement of students in the R&D activities.

CISUC's management structure changed recently. The new structure is described as lighter and more agile. It is not clear how different is the new structure in what concerns the communication with research groups (RG), the coordination of their activities and the exercise of leadership. The impression I got is that the Director is expected to play mostly a coordination role, although it is said that the "Director is responsible for the definition and implementation of the strategic plans". RG seem therefore to be the stronger element in the structure.

In what concerns there seems to exist some overlapping both in what concerns competences and areas of application. The idea of overlapping results from the fact that it seems there isn't much collaboration among RG, in spite of proximity of competences or focus.

It is understood that the report that has been provided corresponds to what is requested by FCT. This reports contains mainly factual information and little attention is paid to strategic reflection. The workshop has vey useful in order to understand CISUC beyond the facts and figures of the report.

Information systems group

The information systems group (ISG) did some rethinking of its scope and is narrowing its interests. There was a research stream in ICT in education that is now being discontinued. Considering the size of the group, concentrating in fewer topics seems to be a correct decision (it seems that the group's web site hasn't been updated as it still presents the research stream that has been discontinued).

The ISG group is now focusing in services and in participatory media. There isn't much information about the goals to be pursued in these two areas, either as research questions to be addressed or as research programs being established.

During the presentation, it has been reported that ISG has no difficulty on attracting students. However, the group has difficulty on getting funds. This seems to be the opposite to what other groups reported.

The research activities of the group seem to be mainly based on contracts with industry. There is also one reference to an European program (EACEA) but no further information is provided regarding the project. The existence of contracts with industry is a good indicator of a concern with transferring knowledge into the economy and society.

On the other hand, there are clues that suggest that the group mainly seeks to seize opportunities to apply its competences. There is nothing wrong with this. However, it would be expected that the group also has its own research agenda to be pursued.

Considering the size of the group (6 full members, according to the group's web site) the articles published by the group during 2011 constitute a good achievement. The result is not as good if the 9 Associated Members mentioned in the group's web site are also considered.

CISUC as a whole

The report shows a remarkable improvement in the scientific productivity of the centre (close to 2x with respect to 2010). This is a very good figure and it is reasonable to assume that such a growth rate cannot be sustained for a long time. Thus, potentially lower growth rates in the future should not be looked down. The income due to funded research projects is also noticeably higher (ca. 900 k€ increase). Near one half of this increase (about 400 k€) originates from the FCT, whereas other national sources provide a net increase of 376 k€ (actually accounting for a decrease in the contribution from national industry to about one half its value in 2010). While the dependence from FCT is large, it is a positive sign that the income is being diversified and that the international contribution has increased by about 100 k€. The industry dimension has however shrunk, which is something to be addressed by CISUC in upcoming years.

It emerged from the discussion held during the workshop that recruiting PhD students is not being an easy task. Apparently efforts are being made to provide an attractive environment for young researchers but still a large part of new pre-doctoral students are being recruited from abroad. The reasons are not completely clear for CISUC members are require an in-depth analysis by the members of the staff responsible fro the doctoral program.

Another issue that emerged during the discussions refers to the cohesiveness of CISUC and the long-term vision of the centre. So far it has served mostly as an umbrella under which different groups have carried out their research. While this provides some advantages if only from the administrative point of view, it should be decided whether the centre should really work as a conglomerate at the research level, looking for synergies among the groups. It was clear from the presentations provided by the different groups that there are numerous overlaps in the research goals (e.g. self-adaptive systems fall within the scope -albeit from different perspectives- of AC, SSE and ECOS; also SSE and AC share interest on GPUs and so do CMS and ECOS in the areas of complex events mobility patterns in the urban space and social simulations). It was commented that in some cases there are communication problems inside some groups, and this is obviously an issue when a larger scale of integration might be pursued. It is nevertheless recommended that a corporate image of CISUC be developed and used by the different groups so that the centre gains visibility as a whole.

ECOS subgroup

The report indicates ECOS has a clearly improved productivity during 2011 with respect to that of 2010, averaging 2.5 papers/person (1.5 in 2010) and 3.1 citations/paper (2.9 in 2010). It is also remarkable that the number of papers in ISI JCR-indexed journals has increased from 3 in 2010 to 5 in 2011. Thus, it seems the group seems to be following the advice stated in the previous evaluation report that suggested a more careful selection of publication targets so as to maximize the impact of their research. Another important point to be pointed out refers to the disappearance of computational biology as a research line in 2011. This was also discussed during the workshop and adequately justified: computational biology was merely an application domain for the techniques developed by the group and hence it was not appropriate to consider it as a research line by itself.

The presentation held at the workshop indicated the group has followed a solid trajectory in the last 5 years, averaging each year 1 PhD thesis, 5 journal papers, 20 conference papers and 100 citations. It is specifically remarkable the international dimension of the group, a fact that was already stressed in the previous evaluation report and that deserves being mentioned again: ECOS have an

active involvement in EU-level projects and bilateral cooperation projects. They have been also recipients of best paper awards in 2011 and 2012 and are regular members of organizing teams of events in the area. This contributes to the international visibility and recognition of the group.

The group has an optimization/problem-solving profile that is not fully reflected in industry cooperation. This is something to be addressed. The fact that the group has developed several patents and prototypes during 2011 should be positively evaluated as a positive step in this direction though. The group presentation at the workshop also suggested that one of the research lines to be promoted is that of complex systems. As commented in the discussion, the number of researchers working in this line is however just a small part of the whole group. It should grow via the recruitment of new PhD students. IT should be noted also the possibility of internal cooperation with other CISUC groups to exploit common interests in this area. Overall, it seems that the group is conscious of its strengths and they have also made a reasonable diagnosis of their weaknesses. Hence, the strategy they pose for the upcoming years is assessed in a positive way.

David Hutchison, University of Lancaster, UK

CISUC as a whole

The impression gained from the workshop was that CISUC came across much better than the written report had conveyed: this of course indicates that next year's report need to be better.

The overview given by Edmundo Monteiro gave an excellent impression of CISUC – it has sound goals, and a strong set of projects funded by the EU and industry as well as from FCT. The overall size of CISUC fits the ambition of the Centre, though in the group presentations that followed, it was difficult to reconcile the overall numbers with those within the groups. This is something that need to be better presented.

Group presentations were very interesting, and the advisory board were able to ask a range of questions which helped illuminate issues that has not been clear in the Centre's report. The groups are of quite different sizes, and there appears to be some overlap of technical interests between some of them – which is a good thing if exploited properly, and indeed there is evidence of active inter-group work.

The session on working ideas from CISUC PhD students was a success, and showed the variety and the vibrancy of the PhD work within the groups. The potential excellence of the CISUC work came through.

In the closing session, in which the advisory group members gave feedback to CISUC members, there was a valuable interaction of views. Issues that arose included the need to strive continually for an excellent research environment; to make sure that research platforms are able to be re-used by later generations and not discarded; in a similar vein, to ensure knowledge transfer across PhD student generations; to consider a systematic use of co-supervision of PhD students, including when the topic is inter-disciplinary but also within and across CISUC groups; how to make Coimbra a more attractive place to study – there was concern about the difficult expressed by some groups of recruiting researchers (both PhDs and RAs); perhaps there is a need to review and possibly increase the salaries that can be offered in the University; and there was a suggestion that the Key Performance Indicators (KPIs) for CISUC should be reviewed.

My own comments are as follows: CISUC needs to graduate more PhD students per year – this is weak according to recent and current figures; there are really excellent people in the Centre, but CISUC could become better known than it is, perhaps by initiating, organising and leading more international activities; there is overlap between some groups and their activities, such that it may be advantageous to CISUC to look at them anew and possibly re-structure them appropriately – perhaps some merging would result; the groups, especially those with long pedigrees, should take a regular look at their research themes and consider whether they need to change anything – this could coincide with a look at the group overlaps; the Centre needs to make sure, especially in the new, harsh economic climate, that it has the right balance between research quality and impact-type work (perhaps with industry or end-users) – continuing to aim its publications at ever-higher-quality outlets while at the same time developing its exploitation activities.

Johan Karlsson, Chalmers University of Technology, Göteborg, Sweden

This document provides a brief assessment of the research activities conducted in the Software and Systems Engineering (SSE) group at CISUC during 2011. In addition, it gives a set of recommendations on the evaluation process and the basic data provided to the external evaluators. My observations and comments are based on information provided at the homepage of CISUC, the CISUC activity report for 2010, and slides presented at the CISUC evaluation workshop held 17 September 2012 at Quinta das Lágrimas in Coimbra.

Assessment of the scientific achievements of the SSE group

In 2011, the SSE group consisted of 20 researchers with a PhD degree. Twelve were full members and 8 were associated members. The number of research students was 32. This included 26 PhD candidates and 8 Master's students.

The scientific achievements for 2011 were as follows. The group produced in total 8 journal papers, 5 book chapters and 53 conference papers. Members of the group served as PC Chair or General Chair for 8 scientific conferences. The group's publications were cited 269 times and two PhD candidates defended their dissertations. The number of publications increased significantly compared to 2010, when the group published 38 conference papers and 3 journal papers.

Overall, I consider the group's achievements for 2011 to be satisfactory. However, my assessment is somewhat uncertain since I have no knowledge of the amount of time the various group members spend on research. My assessment is based on the following assumptions. I assume that most of the publications were produced by the 12 full members and their students, and that the associated members contributed only marginally to the production of scientific papers. I believe a reasonable goal would be that a full member in average should produce 3 conference papers and 1 journal paper per year. This in turn is based on the assumption that full members have a normal teaching load (two one-semester courses per year plus administration) and devote the rest of their time to research and supervision of 3 to 4 PhD candidates. Hence, with 12 full members, the group should have a goal of producing in average at least 36 conference papers and 12 journal papers per year. The average production of scientific papers for 2010 and 2011 was 45.5 conference papers and 5.5 journal papers. From this I conclude that the group's production of conference papers is more than adequate, while the number of journal papers is below what one would expect.

Concerning research quality, it appears that the group members in general publish their work in high quality conferences. The group received best paper awards at the DSN conference in 2009 and the ICWS conference in 2011. This indicates that the research done in the area of computer security is of very high or excellent quality.

The number of PhD students (26) appears to be a bit low for a group with 12 full members. As mentioned above, I believe a reasonable target would be to have in average 3 to 4 PhD students per research leader. (I assume that all full members are research leaders.) This means that the group should aim to have at least 36 PhD students, given that the 12 full members have normal teaching duties and spend the rest of their time on research and research related activities.

During the workshop discussions it became clear that the group works hard to attract funding, especially from the EU, in order to increase the number of PhD students. The number of funding applications which the group members are involved in is quite high. The key challenge is to increase the number of successful applications. It is my impression that the group members are aware of this

challenge and that they are devoting much time and effort on finding ways to improve the quality and success ratio of their applications.

In conclusion, I believe the scientific achievements of the SES group for 2011 is of high quality and fully satisfactory in terms of conference publications. I recommend the group to aim at extending more of their conference publications into journal papers. To this end, I recommend the leaders of CISUC and the SES group to consider creating new incentives for PhD students and researcher to write journal papers. I encourage the group to continue focusing on improving the quality of their funding applications in order increase the percentage of successful application. To address this, believe it is essential find a good balance between high risk and low risk applications.

Comments on the evaluation process

Evaluating the scientific achievements of a research group is an important but also difficult task. In order to leverage the evaluation effort in the best possible way and also ensure a fair and accurate assessment, I would like to see some improvement in the quality of the information and basic data provided to the external evaluators.

For the assessment of the research quality it would have been useful to have access to the group's own quality ranking of the conferences and journals in which they have published their work. I understand that such a ranking will be provided in the activity report for 2011. However, for my assessment I had to rely on the publication list available on the CISUC homepage where no quality ranking is provided.

I noted some discrepancies between the data presented at the workshop and that provided at the homepage of CISUC concerning the publications of the SSE group. The number of journal publications was stated at the workshop as 7 while the homepage lists 8 journal articles. The number conference papers stated at the workshop was 46 while the homepage lists 53 publications. (A rather significant difference!) The number of book chapters stated at the workshop was 5 while only 1 book chapter is listed in the homepage. I am not sure if these discrepancies are accidental and intentional. If they are intentional, I believe that they should have been explained and pointed out to the evaluators.

At the workshop we received detailed and well-structured information about the achievements of the various research groups in CISUC. However, I was a bit surprised that none of the groups had made a serious attempt to evaluate themselves. In particular, I missed information about the strategic goals of the groups expressed in terms of key performance indicators. I would have liked to have seen discussions like: "The group has now X PhD students. We aim to increase this number to Y students over the next Z years by doing the following things: ..." or "We are pleased with the number conference publication we had this this year, but we didn't meet our goal for journal publications. We aim to change this for next year by ...".

Comparing strategic goals with actual results and formulating plans to achieve the goals is in my opinion fundamental for achieving excellence. Hence, I recommend CISUC to consider establishing a procedure for self-assessment and to use this as a tool for continuous improvement.

Annexe

CISUC Workshop

Theme: CISUC research strategy for the next decade

Date: 17th September 2012

Place: Quinta das Lágrimas, Coimbra

General Chair: Edmundo Monteiro

Program Chairs: Marco Vieira, Carlos Fonseca

09h00 – 09h30 Opening and welcome address, Edmundo Monteiro, CISUC Director

09h30 – 11h00 Group presentation (I), Chair: Edmundo Monteiro, CISUC Director

Adaptive Computation (AC), António Dourado

Cognitive and Media Systems (CMS), Amílcar Cardoso

Software and Systems Engineering (SSE), Marco Vieira

11h00 – 11h30 Coffee break

11h30 – 13h00 Group presentation (II), Chair: Marco Vieira, Program Chair

Evolutionary and Complex Systems (ECOS), Ernesto Costa

Information Systems (IS), Paulo Rupino

Laboratory of Communications and Telematics (LCT), Fernando Boavida

13h00 – 14h00 Lunch break

14h00 – 15h30 Working Ideas from CISUC PhD students, Chair: Carlos Fonseca, CISUC Subdirector

6 PhD student presentations of 15 minutes (10 + 5) one from each group (to be selected)

15h30 – 16h00 Coffee break

16h00 – 17h45 CISUC Quo-Vadis: Round table with AB members, Chair:

João Alvaro Carvalho, AB Chair

Pedro Barahona, Universidade Nova de Lisboa, Portugal

Carlos Cotta, University of Malaga, Spain

David Hutchison, University of Lancaster, UK

Johan Karlsson, Chalmers University of Technology, Sweden

José Carlos Príncipe, University of Florida, USA

17h45 – Wrap-up and Conclusions, João Alvaro Carvalho, AB Chair

Questions to be answered by the group coordinators in their presentations:

1. What are the most significant scientific contributions of your group in the last 5 years (3 to 5 contributions)?
2. What the core competences of your group?
3. What are the main research questions that your group will address in the next decade?
4. How are you going to organize your research group activities in order to answer those research questions?
5. How do you plan to attract resources to conduct your research activities (people, funding, infrastructures, collaborations, competences)?

Questions to be answered by the advisory member in the round table:

1. Comments about the past activities (2011 report)
2. Advise about the future plans (based on the group presentations)