

# **Minutes of the seventh ALADIN PAC Meeting**

## **Budapest, November the 30<sup>th</sup>, 2010**

### **Participants**

#### *PAC members*

Cornel Soci (CS) - chairperson  
Philippe Bougeault (PB)  
Alain Joly (AJ)  
Maria Jose Monteiro (MJM)  
Gabor Radnoti (GR)  
Radim Tolasz (RT)

Jean-François Geleyn (JFG)- ALADIN Programme Manager

#### *Observers*

HIRLAM Advisory Committee chairperson:	Mikko Alestalo (MA)
RC-LACE Project Leader:	Dijana Klaric (DK)
CSSI chairperson:	Piet Termonia (PT)

#### *Secretary*

Daan Degrauwe (DD)

#### *Excused*

Adérito Serrão – vice chairperson  
Abdalah Mokssit

### **1. Welcome and opening of the meeting**

The 7<sup>th</sup> PAC session was opened by the President of the Hungarian Meteorological Service, Dr László Bozó, who welcomed all the participants and wished them a fruitful meeting. Then, the PAC chairperson CS welcomed everybody and introduced Alain Joly as a new PAC member who replaces Gwenaelle Hello. CS also thanks Gwenaelle for her contribution as a member of PAC.

### **2. Adoption of the draft agenda**

PAC agrees on the agenda.

### **3. Final approval of the Minutes from the sixth PAC meeting**

The minutes of the sixth PAC meeting are approved.

#### 4. ALADIN planning

##### a) *Present status of the common HARMONIE 2011 work-plan elaboration (CSSI Chair)*

Piet Termonia (PT) gives a presentation:

- new time schedule for planning of the work-plan (WP).
- it has been decided during previous meetings (HIRLAM Advisory Committee: HAC, PAC) to proceed with the merge between HIRLAM and ALADIN from the scientific basis (common WP); governance collaboration will come later.
- most important step forward this year is the common WP with HIRLAM.
- priorities suggested by PAC are in the WP, except the outcome of BRAC-NH workshop (to be discussed today – item 6c on the Agenda).
- a midterm review table for WP2010, filled in by Local Team Managers (LTMs), served as the basis for WP2011.

Philippe Bougeault (PB) asks what ‘midterm’ means in this context.

Mikko Alestalo (MA) agrees that midterm is somewhat misleading, and asks what the reference is.

PT answers that the reference is WP2010 and stresses that it has nothing to do with the 4-year plan midterm auto-evaluation. He explains that the review table is intended as a useful tool, not as an official document.

PB asks if it wouldn't be better to have such a document at the end of the year.

PT answers that the main purpose is to help writing the next year's WP.

PB wonders if the July-July evaluation period is ideal and asks where the second 6 months evaluation is used?

PT agrees and proposes that PAC makes a suggestion for this.

Alain Joly (AJ) agrees that it is a useful WP design tool.

MA notes that HIRLAM has 6-month ‘progress reports’, referring to the previous six months. It is similar to this document, but it is written by the HIRLAM Management Group, instead of by the LTMs.

Maria Monteiro (MJM) asks what the planning would be: if this document is finished in January or July, it would already be out-of-date by the PAC meeting in May.

MA proposes that the two Programme Managers (PM) could start to write joint progress reports.

PT explains that this year was special (CSSI chair will become new PM), but this tool could evolve into something more structural. The question is whether it should serve as input for the

WP (i.e. for PM and CSSI chair), or as input for management (i.e. PAC).

PB stresses MA's point that interaction with HIRLAM could and should be optimized.

PT answers that he should discuss this with HIRLAM PM Jeanette Onvlee, and that he will make a proposal in the next PAC meeting.

Dijana Klaric (DK) points out that ALADIN and HIRLAM have a different structure: HIRLAM has a management team, which ALADIN has not. Hence, 2011 seems too soon for such a merging. She asks for an outline of the time table of events.

PT answers that this exercise was done for 2010, and that this will be done also for 2011.

DK says that the schedule is not the same for the review table as for the WP.

PT says that this exercise shouldn't be too difficult.

MA stresses again the importance of optimizing the HIRLAM interaction.

PT explains the status of joint schedule with HIRLAM. The deadline for specifying manpower contributions turned out to be too short.

MA remarks that HAC was very pleased with the draft of a first ever joint WP.

JFG notes the complexity of the input from Météo-France (MF), and proposes to put it either at the beginning or at the end of the time window when other contributions are included.

AJ answers that MF's situation is not so special. His worry is that if they are to provide manpower plans, these can intervene with MF's own plans.

PT points out that in practice, it is MF's LTM whose task is very difficult, and refers to the deadline issue mentioned before.

PB asks if the MF LTM input is just an approval, or really input.

PT answers that a real modification on verification was done this year when in fact the work plan was already discussed in the HAC meeting. He says that by moving some events in the time schedule could solve this issue. He proposes that the EWGLAM meeting should be the final deadline for the CSSI members to contribute to the WP content.

**PAC agrees on this point.**

MA agrees that the WP content could normally be specified earlier than the names of the persons who will perform the work.

AJ (working on a preliminary version) perceives the joint WP2011 as a very good document, but fears that it may be a bit too ambitious.

PT answers that it will run longer than 2011. This plan contains the topics we plan to work on in

2011, but that does not mean we will finish them in 2011.

AJ remarks that in his preliminary version, the manpower planning is very heterogeneously provided, e.g. there is no indication of person months for HIRLAM contributions.

PT answers that this is now solved. Due to time table issues he could not yet provide the latest HIRLAM version with their man power numbers, as input for this PAC meeting.

AJ also notes that some people have already disappeared etc. He proposes to 'globalize' the WP. He also mentions that keeping pace with ECMWF is a troubling factor.

MA comments that their observer noticed that interaction with ECMWF is special, and that the ECMWF resources are not a part of the HIRLAM programme.

PT notes that we talk about ECMWF contact points rather than about ECMWF staff.

PB notes that some tasks are only 0.5 person-months (pm). This is not very credible.

JFG notes that the proposal for MF input could be used for two other parties (LACE and others). This would result in a globalization into 3 parties.

DK says that LACE LTMs would like to see the names of the working people.

JFG answers that the names can be there, just not the individual itemizing of pm.

DK points out that LACE LTMs ask for more power in deciding which person does what task when.

AJ is surprised that there is no involvement of radar group people, which is absolutely necessary for any success when using radar in NWP. Checking with UK and German weather services, it turns out that the OPERA database is not fit for direct NWP use. He also notes that there is certainly some room for more coordination in the topic of short range EPS. AJ proposes to mention 'scalability' in the title of the topic on OOPS-computational efficiency and portability. He also explains that the work at CERFACS (offline SURFEX) is relatively independent from the work at GMAP (AROME-SURFEX). Both aim at enabling the use of OpenMP with the SURFEX in their respective context, and indeed both models do enable OpenMP. In AROME, the impact of the GMAP changes appears to be neutral on the NEC SX9 and to work well on the ECMWF IBM.

JFG points out that the main problem was that SURFEX blocked OpenMP also in other parts of the code.

AJ comments that agreement with ECMWF on OOPS is somewhat different than what is specified in WP2011. There is agreement for modularization of the code in Fortran, while the benefit of the object layer has to be demonstrated by developing further the "toy" model. Developments of the "toy" model should also enable to improve the various base objects and classes. Two parallel streams of work should therefore exist, at least in WP2011: (i) modularization, with significant involvement of the limited area community to keep up with ECMWF especially on model aspects and closely related configurations such as full-pos and

E927 and friends and (ii). Targeted participation on the “toy” model. It is noted that ECMWF already goes much further than wished, and that this affects the MF staff planning.

JFG asks if they will go even further (with the C++ part).

AJ answers that the level at which OO stops keeps going down. Modularization means moving away from the concept of COMMON to move towards actual modules, that is semi-independent pieces of code, with their own set-up, initialization, etc. With this in mind, even the FORTRAN-only work is likely to lead to changes of most of the code.

Gabor Radnoti (GR) says that it was never agreed that below some level, routines could not be touched.

PT says that the HIRLAM WP starts with a few pages with deliverables and that he removed these from the ALADIN WP because they are rather HIRLAM-specific.

MA expresses a HAC remark that the links with strategy are too weak in WP2011. He asks if phasing is mentioned in WP2011.

PT answers that it is.

CS proposes to close this discussion as follows:

**PAC took note of the progress report and provides some guidelines for the WP2011 content (e.g. short motivation of the work plan to reflect the strategy).  
PAC also recommends the optimization of the interaction with HIRLAM in order to design a common WP.**

## *b) Present status of the 4year plan mid-term auto-evaluation procedure (PM)*

JFG apologizes that he didn't have time to prepare this topic. He proposes to communicate with PAC once it is done, and that this topic will be discussed in the next PAC meeting.

## **5. PAC matters: (if any defined on the spot)**

MA asks PAC to confirm that a HIRLAM observer will still be present at future PAC meetings.

JFG answers that this will be the case.

## **6. ALADIN programme definition**

### *a) Update on important recent event:*

#### *i. EWGLAM/SRNWP meeting in Exeter, NH modelling ECMWF workshop, various WG sessions for COST ES0905 (PM)*

EWGLAM

Summary on physics by Sander Tijm.

Summary on BRAC-NH workshop: laterality, stochasticity, memory, (scalability).  
Dynamics: vertical issue, sound-proof equations,  $p$ - or  $z$ -type vertical coordinate, time step organization.

#### ECMWF-NH

Dynamics: spectral or not, semi-implicit or explicit, semi-Lagrangian or Eulerian,  $p$ - or  $z$ -type vertical coordinate, Euler equations and sound-proof equations, conservation laws or not?  
It is not clear what will be the best choice in 10 years time, although not all combinations are consistent.

Physics: Cloud Resolving Model to GCM: a lot of aspects are connected. Unified modeling should be kept as a target.

#### ES0905 WG3

Stochasticity, memory, laterality -> CA (cellular automata) look quite promising.  
Work of Rachel Honnert  
No unanimity on closure, micro-physics geometry, entrainment specification and link with shallow convection.  
Agreement to support Luc Gerard's path (ALARO-1) of convection-permitting schemes.

DK comments on SRNWP verification meeting. The first results of model inter-comparison were presented. Next steps in SRWNWP-V program were discussed. She asks which reference version consortia will provide.

MA confirms that HIRLAM will continue to use a 7.5 km-resolution model for some time.

MF would use either ARPEGE over the whole of Europe, or AROME just over France.

LACE started to send operational output of CHMI 4.8 km output, although no DA is present in that model.

DK says that we should expect questions from EUMETNET on this.

MA says that during HAC, MF-AROME was compared with KNMI-HARMONIE. AROME appeared to perform better than HARMONIE, possibly due to its larger domain. He asks if it could be a general conclusion that mesoscale (2.5km) models should run on a larger domain.

JFG answers that he would like to see a comparison with ALARO-1 as well.

AJ asks if this was done with the latest AROME version, which has its domain extended.

MA answers that he is not sure about this.

PB observes that as we go to higher resolutions, the consensus on basic equations decreases. He thinks that it is very interesting that some people are developing new dynamical cores,

even if they test them with toy-models.

JFG notices that DWD did some deep reflection on this, but decided to keep many COSMO aspects in their ICON system.

AJ mentions the cooperation between NERC, NCAR and UKMO, which is fully open. It will start with a workshop in March. ECMWF was invited to join.

PB mentions that the UKMO goal is to develop a new, massively parallel, dynamical core. Climate modeling is a main motivation for this work.

PT asks if it is also useful to work further on existing schemes, or if we should really start from scratch and study numerics.

JFG answers that for NWP purposes, the current dynamical core seems fit.

MA asks how we will participate in this project.

PT answers that we will come to this later (agenda point 6.c).

*ii. CSSI/LTM meeting in Exeter (CSSI Chair); NB: a wider discussion on SURFEX could probably take place at this stage*

PT remarks that most of these topics are discussed elsewhere. He explains that a proposal regarding the SURFEX topic was made, which stresses the importance of coordination. He notes that all effort (both on optimization and e.g. physics) should enter the code.

JFG says that in the long term, there is always a conflict between the divergence of solutions and maintenance.

PT discussed this with Claude Fischer (CF), and found it to be a problem that the cycling of SURFEX is different from that of ALADIN. Coordination and follow-up are needed.

PB states that CNRM will reassess the current situation, the benefits and limits of the work performed in 2010 to improve SURFEX. CNRM will also prepare some proposals for the governance of the evolution of the SURFEX software with the perspective of widespread usage for both research and operational activities. First proposals should begin to be circulated within 2 months, with a view to finalize the new governance at the next PAC meeting.

JFG explains that CF is afraid that this will fall back on the maintenance. He proposes that PAC expresses that we are not counting on classical maintenance to solve this issue (and future similar issues).

**PAC agrees on this.**

AJ explains that CF made a practical proposal for 2011, consisting of two streams of developments: SURFEX (current version 6) and ALADIN (current cycle 36).

PT gives a diagram of CF's proposal, and stresses that, at this stage, it is IS only the result of

a brainstorming, no concrete plan has been agreed upon yet.

AJ explains that the “36t1+optimization” intermediate cycle with optimizations for SURFEX, could become some “export” package, on which partners can perform their developments and tests. The phasing of this work should enter the WP.

PT answers that this is difficult because of the interaction with HIRLAM. PT says that if different developments are done, and if there would turn out to be conflicting developments, some judging (‘arbitrage’) may become necessary. In order to anticipate this some coordination is necessary.

In C. Fischer’s proposal for the short term GMME should remain the scientific contact about SURFEX; GMAP only helps with phasing both with respect to the IFS-ALADIN schedule and the SURFEX “versions”. The ALADIN Network Manager (a currently open position) could help streamlining this process.

MA says that this was not discussed in HAC.

PT asks that this topic will be followed-up in the next PAC to avoid that it disperses. He will contact CF to provide a document outlining the route.

## *b) Upgrade about the so-called ‘Convergence actions’ (PM)*

JFG admits that his text is controversial, both the topic itself and his views. He asks PAC to take a position in this. He says that a consensus on actions A (diagnostics) and B (governing equations and tendency computations) seems to have been reached, but that for actions C (microphysics) and D (‘3MT in ARPEGE’), the future is less clear. JFG gives a short historical recall since 2003: Toolbox (all options interchangeable) → Interoperability (less ambitions but still impossible to concretise) → Convergence → ????vergence. Political ambitions have been going down all along. JFG observes a change of position of MF: they now say the future is PC-MT, not 3MT.

PB explains that this is the feeling of MF scientists.

PT says that even 3MT expert Luc Gerard did not know that MF scientists may move away from 3MT “as it is” in ALARO. He wonders why no one contacted Luc Gerard about it.

AJ says he does not want the difference between 3MT and PC-MT to be overlaid since they are both MT-like schemes.

PB says that the MF scientists didn’t test 3MT itself, but tried to develop a framework to test it, and found this too difficult.

JFG believes that a status quo cannot be maintained (MF does not ask any help in face of difficulties and then decides unilaterally). He has no problem with critic, but asks that substantiated explanations are given for it.

AJ finds it funny that JFG criticizes people who want to control their physics from A to Z.

JFG explains that the goal of convergence was exactly to make combinations possible, not to decide who controls what.

AJ says that MF found that it never worked properly, despite the fact that his people are very good scientists. They always take very cautious moves. The PROC section had definite, written plans to reuse as much parts of 3MT as implemented in ALARO as possible. This meant moving away from the current ARPEGE-ALADIN microphysics routines, which was accepted. However, after trying for several months, the plans had to be changed and a different track was taken. The reasons for this are both technical and scientific.

JFG says that 'not understanding' is not a reason to give up and to dismiss comparisons.

AJ explains that people like himself have been asking for '3MT in ARPEGE' results for years, that "pressure" may have played a part in the recent turn of events, but it is mostly motivated by the PROC section internal discussions on some of the scientific choices.

PB says that MF tried everything they could to perform convergence actions C and D and have to admit it will be impossible.

AJ explains that Jean-Marcel Piriou and Eric Bazile tried developing the APLMPHYS framework to use the MT concept in 2009. They came up with PC-MT in spring 2010. Francois Bouyssel pointed out some additional problems about precipitation geometry and Xu-Randall vs. Smith.

JFG says that RC LACE proposed to send to Toulouse an ALARO staff member to solve this Xu-Randall/Smith business, but the exchanges between him and the PROC section diverged (already at that time of late 2009) on what should be the aim (protecting the ARPEGE code 'as is' vs. introducing a bifurcation in the existing 3MT code), so the idea had to be dropped at short notice.

PT also sees a strange signal in this stay having not been possible, even if the scientific situation was yet not firmly defined. PT generalizes: MF historically decided to focus on AROME, but it was then feared that this could lead to competition with scientific developments that would continue within the research Institutes of the partners. The idea of convergence was to create a framework where cross-fertilization could take place, instead of competition. There will always be some point where we have to choose between different solutions. But we should be careful now not to compromise the convergence process and not to terminate 3MT.

AJ stresses that this is not the end of 3MT. He also does not have this notion of competition. AJ sees it as a new asset that the same physics are used at MF in NWP-hydrostatic and climate. Also, the cost of maintenance is less.

JFG answers that the maintenance of 3MT has been and will be provided by ALARO people.

AJ says that what the PROC section is developing seems to be simpler than what is currently called 3MT.

JFG also notices the strange fact that one person of the Partners' NMS can start working on the

APLMPHYS code after two weeks of training, while 3 experienced MF people give up after several months.

JFG gives 3 possible PAC recommendations:

- (1) Stop convergence after actions A and B (forget about C and D).
- (2) Make PC-MT 'ALARO-physics'-compatible.
- (3) Jointly codify a precise definition of '3MT in ARPEGE with maximum use of existing ARPEGE process description' and let the ALARO team code it.

PT says that Luc Gerard is interested to scientifically test ARPEGE with 3MT himself in Brussels

AJ says that, among others, Olivier Rivière already tried this.

PT says that Luc Gerard can probably go a bit further in this.

JFG says that the main question is whether we put block against block, or if we allow combinations of individual parts.

AJ finds it difficult to commit himself at this stage: PC-MT is only in the development stage, plus resources at MF are scarce because of the additional work needed for OOPS. In the short term, modifying PC-MT to the ALARO framework (option (ii) above) is not feasible.

DK sees this topic in the broader question of centralizing. Now the problem is that we loose motivation or working power to finish what we decided in the past. We should take a clear point in this now, before signing the MoU. LACE could offer resources to carry out the work. The question is who makes the decision.

PT believes that people are sensible to arguments, but arguments are needed. That is why it is strange that no interaction between Jean-Marcel Piriou and Luc Gerard took place.

DK sees this problem as a consequence of the fact that it is unclear at what level decisions are made.

MA sees it as a conflict between MF, who has to defend its own interests, and the big consortium around it. The problem is deeper than just this issue, and it should be solved at a higher level. HIRLAM doesn't suffer from this kind of problems.

JFG says that issues C and D are at a lower level than the interface: B can be done, but care should be taken that it is then not just a cosmetic tool.

PB agrees that A and B should be further developed. A lot of work has been done in C as well.

AJ says that MF sees a long-term benefits of splitting ICE3. He proposes that 3MT experts discuss directly with the PROC section. If someone finds a way to modularize 3MT, it would be simpler for all to use it in ARPEGE.

JFG does not like the unilateral standpoint of MF on the 'ICE3 splitting' action (not expressed now by AJ but written in some mails).

AJ doesn't understand why JFG makes a political issue about what turns out to be, at the bottom line, a strong disagreement between scientists on a scientific question.

PB says that it would be good to exchange parts of the physics, but not if the price to achieve this is too high.

AJ agrees that if the geometry issue of 3MT is solved, as well as the handling of stratiform ↔ convective precipitation, the "3MT in ARPEGE" path could more easily be followed. This is option (3) of JFG's proposal, with additional constraints.

PB proposes to define a working group to set out the further evolution of convergence actions C and D.

AJ asks what the ultimate goal would be.

JFG answers that the goal is that parts of physics are exchangeable. JFG fears that even after solving the geometry issue, MF will not accept it.

GR finds it difficult to make a decision about such a technical topic at PAC level; it should be scientists who discuss about this.

JFG still finds it not acceptable that MF beforehand refuses some parts of a comparison.

MJM agrees with DK and sees it as a problem of (de)centralization. If the plan is not followed, arguments should be given why this is the case.

PB answers that the reason is that they tried, but didn't succeed.

MJM proposes that the scientists give their view on a technical issue like this.

JFG agrees with this proposal.

AJ appoints out that similar words could apply between MF and other partners in the area of data assimilation, yet the issue is not raised, at least not in conflictual terms: there are different avenues for studying a given topic and they have to be explored. It is also a matter of manpower distribution between maintenance and science. He doesn't perceive the convergence issue as a competition between 3MT and PC-MT, which are in a different development stage.

MA supports the proposal that a task force should work out the technical details.

JFG asks if PAC agrees that the current situation is not sustainable.

**PAC agrees on this.**

JFG asks if it is agreed on that C is not separable from D.

**PAC agrees.**

*c) Follow-on of the BRAC-HR event (Interim report by the CSSI/HMG expert team (PM); preparation steps for the next workshop (HIRLAM observer)*

JFG summarizes the expert team (ET) report and observes that many options are open, and that efficiency is broader than scalability. The ET mainly focused on data flow issues.

MA says that the follow-up workshop will take place late April or early May. HIRLAM PM will confirm the date later.

JFG says that since the ET report is far from complete, this is no problem.

MA agrees that the intermediate report is not sufficient for organizing the workshop.

PB finds the intermediate report very disappointing and too defensive. There is a lack of long-term thinking.

PT asks if there isn't a lack of input from computer scientists; the ET members are after all, NWP people.

PB sees it as a task of the team to seek for this input. It seems as if they are not really interested to carry out this task.

JFG sees the disappointing outcome of the BRAC-NH workshop as a key reason for the defensive stance. Additionally, the fact that some topics in the WP are not carried out, works demotivating.

PB asks whether we should involve experts from outside the NWP community in this brainstorming process.

JFG answers that 3 out of 4 ET members are experts on machine architecture as well.

PB finds that two issues are mixed too much: using the current code on future machines, and taking advantage of future architectures by changing the code.

MA also believes that they need some encouragement.

PT feels that some fresh input is needed on this topic.

JFG agrees with PB that the scientific aspects are moving. Maybe the team should be extended with people like Sami Saarinen and a MF expert.

PB answers that GMAP has a lot of additional duties to perform at the moment, so it will be difficult to find resource.

PT paraphrases part the discussion about the work of the ET. We should try more to run the existing code on large machines, in order to provoke the code and to find weaknesses, to get hints for an approach for adapting it for enhanced scalability.

JFG says that we cannot go to the General Assembly (GA) with this. We need to sort out 3 kinds of problems: scientific, architecture issues, and short-time developments.

DK also notes that some members of the ET will not be part of HMG.

JFG says that it would be dangerous to replace them now.

PB notes that they mention themselves that further investigations are needed.

MA says that the terms of reference for the ET should be more substantial.

JFG summarizes the terms of (new) reference for the ET:

- Complete a multi-function WP and keep track of its fulfillment.
- Separate problem of (i) running current equations on massively parallel machines and (ii) try and find what might be necessary evolutions of the scientific solutions, still under an efficiency constraint.
- More concrete proposals for actions in the near future, especially short-term ones. JFG proposes to provide a deadline for the ET.

**PAC took note of the complexity of the problems and agreed on 11<sup>th</sup> of March as the deadline for the ET report, centered on a WP problematic.**

## **7. Resource matters**

### *a) Budget matters*

#### *i. Report about the ongoing execution of the 2010 budget (PM)*

JFG explains that most of this was discussed during the previous PAC meeting. A zero budget sum is not reached. However, the total sum at the end of MoU3 (from MF's point of view) remains (close to) zero.

PAC has no further comments on this topic.

#### *ii. PAC's guidance for the preparation of the 2011 budget (CSSI Chair)*

PT says that the flat rate for next year will be € 8200.

JFG poses the question if we accept this ceiling.

CS notes that this was agreed on during the 6<sup>th</sup> PAC meeting, and sees no reason to change it.

PAC has no further comments.

## **8. Information (if time permits it) about the progress towards the signing of the new MoU on 15/12/10 (PM)**

JFG reports that HMC had some comments. Hopefully, the final text will be available this week.

It's no legal problem that not everyone will sign at the same time.

PAC has no further comments on the MoU.

#### **9. A.O.B.**

MA says that the HAC chairman will be elected next week. He says that this is his last PAC attendance and thanks PAC for the meetings.

CS thanks MA for his attendance and for the excellent cooperation with HIRLAM.

DK asks what will be reported to GA.

JFG answers that the minutes will be finished by then.

#### **10. Date and place of the next PAC meeting (tentatively)**

PT invites PAC next year in Brussels. The date is 6-7 June , noon-noon.

#### **11. Closing of the meeting**

CS closes the meeting.

PAC thanks CS for his excellent job as PAC chair.