



## Computing Resources Review Board

15<sup>th</sup> April 2008

### Minutes of the 13<sup>th</sup> Resources Review Board Meeting Held at CERN on 15<sup>th</sup> April 2008

#### Present:

##### *Europe:*

C. Wulz (bm:bwk, Austria) (*Observer*);  
 J. Lemonne (FWO, Belgium); J. Sacton (FNRS, Belgium);  
 M. Lokajicek (MSMT CR, Czech Rep.), J. Ridky;  
 J. Dines Hansen (National Science Research Council, Denmark);  
 M. Raidal (Estonian Ministry of Education and Research, Estonia);  
 D.O. Riska (HIP, Finland), T. Tuominiemi;  
 J. Zinn-Justin (CEA/DSM/DAPNIA, France);  
 F. Le Diberder (CNRS/IN2P3, France), F. Malek ;  
 V. Guelzow (DESY, Germany); S. Bethke (MPG, Germany); T. Hebbeker;  
 G. Vesztegombi (NKTH, Hungary);  
 E. Rabinovici (ICHEP, Israel), L. Levinson;  
 U. Dosseli (INFN, Italy), F. Ferroni;  
 A. J. Van Rijn (NIKHEF, The Netherlands);  
 B. Jacobsen (Norwegian Research Council, Norway);  
 M. Turala (Ministry of Science & Education, Poland);  
 F.-D. Buzatu (Nat. Authority for Scientific Research, Romania), L. Puscaragiu;  
 V. Savrin (Federal Agency of Science and Innovation, Russia);  
 R. Lednicky (JINR, Dubna);  
 J. Fuster (MEC, Spain), N. Colino, D. Espriu;  
 T. Ekelof (Research Council, Sweden);  
 T. Nakada (SER/SNF/ETH/CSCS, Switzerland);  
 I. Turk Cakir (TAEK, Turkey);  
 G. Zinovjev (National Academy of Sciences of Ukraine);  
 J. Seed (STFC, United Kingdom).

##### *N. America:*

W. Davidson (CFI, Canada), R. McPherson;  
 M. Pripstein (NSF, U.S.A.);  
 S. Gonzalez (DOE, U.S.A.), T. Ferbel;  
 L. Bauerdick, J. Butler, R. Cousins; H. Gordon, J. Shank, M. Tuts.

##### *Asia:*

G. Chen (MoST/NSFC, China), P. Cheng, H. Li, X. Liu, Y. Zhang;  
 P. Veeraraghavab Pakshi (DAE, India), A. Gurtu;  
 K. Saito (University of Tokyo, Japan), T. Kawamoto;  
 K. Song (KICOS, Korea), J. Choi, Y-I. Choi, D. Myung Lee;  
 S.C. Lin (Academia Sinica, Taipei).

##### *CERN:*

J. Engelen (Chairman), H. Renshall (Secretary),  
 J-J. Blaising, P. Geeraert, D. Jacobs, G. Lafferty, E. Van Hove, W. Von Rueden;

##### *LCG:*

I. Bird, S. Foffano;

##### *ALICE:*

J. Schukraft, Y. Schutz;

##### *ATLAS:*

D. Barberis, F. Gianotti;

##### *CMS:*

M. Kasemann;

##### *LHCb:*

T. Nakada.

## 1. Introduction

**J. Engelen, Chief Scientific Officer**

J. Engelen welcomed RRB delegates to this parallel session of the LHC Resources Review Board concerning computing. He asked delegates to please identify their name and institution when making an intervention.

## 2. Approval of the Minutes of the 12<sup>th</sup> Meeting (CERN-RRB-2007-123)

J.Engelen asked delegates to give their approval or make any comments on the minutes of the last meeting, CERN-RRB-2007-123. There were none so the minutes were taken as being approved.

## 3. Status of the LCG Project

**I.Bird, Project Leader**

Paper CERN-RRB-2008-037

Presentation CERN- RRB-2008-038

J.Engelen proposed to now move to the most important item on the agenda, the status of the LCG project.

I. Bird began by saying that the above two documents contained the details of everything he was about to say.

His slide 2 showed the per site cpu usage during January-February 2008 indicating that Tier 2 sites provided over 50% of the total compared with the canonical expectation of 20% at CERN, 40% at Tier 1 and 40% at Tier 2. He explained that in the last few months experiments have moved simulation to their Tier 2 in line with their computing models. Also there are now more than 100 Tier 2 ranging in size from very large to very small. He encouraged those sites not yet reporting their accounting to do so.

On slide 4 he pointed out that the 2008 Common Computing Readiness challenge was at the scale we expect computing to be this year. In May they expected all 2008 resources to be in place and he hoped delegates were going to confirm this.

On SRMv2 deployment (slide 5) which was a worry from the end of last year, there are now about 124 end-points in production. We still need some effort in configuring the underlying mass storage systems and there will be ongoing tuning over the next couple of years.

Castor performance (slide 6) was no longer such a concern as before though we still have to check for possible interference between the experiments. As regards data transfer (slide 7) we saw well in excess of the targets with all experiments at or above the required rates. Tests are continuing.

Another aspect noted as of concern in the last LHCC report was 24 by 7 support where only 7 Tier 1 had put this into operation. During the February 2008 Common Computing Readiness Challenge run all the Tier 1 understood better this requirement and I.Bird said he was confident that all sites would be ready for the May run. He summarised the February run as preparing us to concentrate on what was missing or weak and added that there were concerns about manpower at sites.

He moved on to reporting reliability (slides 10, 11, 12) where there have been steady but slow improvements. There remain large variations among sites that must be addressed over the next years. A lot of problems arise from local Mass Storage Systems. S.Gonzalez (DoE) asked how reliability was defined ? The reply was that we run tests at each site which probe the various services once per hour. I.Bird added that another issue in improving reliability is that we need real contact people for the Tier 2 federations who will feel responsible for following up on issues.

In the Applications area (slide 13) he highlighted two new projects that are not formally part of the AA – exploiting the increasing numbers of cores on a chip, which is becoming increasingly important – and portable analysis wrapping up complex software environments using virtualisation technology.

On EGEE and EGI (slides 14 and 15) he remarked that EGEE 3 has 20-25% less staffing than EGEE 2 so this will have some impact on HEP. It is important we can rely on their priorities being what we need. The longer term future lies with EGI and there are concerns in the way this is going where there is a reluctance to accept the costs of the level of functionality currently supported under EGEE.

His last topic (slide 16) was that of power in computer centres where computing power per watt has not shown the growth we had been hoping for. We have had some benefit from multi-core technology but the evidence is that this is slowing down and also improvements in power supplies have already been made. Several sites are addressing this issue.

I. Bird then summarised that we have seen many cases of problems in procurements this year and that we are late in getting capacity in place at several large centres. In future sites must rethink their procurement strategies allowing themselves up to a year ahead for the process.

### **Discussion**

J. Engelen thanked I. Bird for his presentation adding that it was impressive to see such an enormous collaboration is capable of collaborating effectively and bringing this project to a state that is really required for LHC startup. There were various elements in the presentation that would merit special attention, first of all the status of the project proper and its performance evolution.

M.Turala (Poland) said the project is going well but you raise the serious issues of 2009/10 when EGEE 3 will be over and NGIs (National Grid Initiatives) will take over and that already there is a 20-25% funding drop over EGEE 2. Do you have any estimate for how much manpower is financed today by EGEE in the T1/T2 and T3 ? I. Bird replied he did not have the figures in his head but that it was fairly significant. The core of the T1 staff is funded outside of EGEE, however a lot of the tools we rely on – accounting, the operator on duty – are entirely funded by EGEE and these are essential things to maintain a reliable service. At the end of EGEE 3 support for operations should have already moved down to sites and regions and if the transition was today we would be in a mess but I can imagine transition scenarios in 2 years time. M.Turala estimated that the shortfall to be found would be of the order of 10 MCHF per year to which I. Bird agreed. On the role of the NGIs J.Engelen invited the delegates to think about this and take action back home. I.Bird added that the national NGI representatives are well known and that we will attach the list (or a pointer to it) to these minutes (the pointer is <http://web.eu-egi.eu/partners/ngi/>).

There were no more comments on the status of the project and J.Engelen then pointed out there will be a ramp-up of resources over the years with an anticipated growth of the power needs and that we are working on this at CERN. He asked the delegates if they are assuming this problem will be solved automatically for them or was it a concern ? D.Riska (Finland) said it was indeed a concern for them but there were no other comments.

#### **4. LHCC Deliberations (paper only)**

Paper CERN-RRB-2008-016

#### **E. Tsismelis, LHCC Scientific Secretary**

#### **5. Status of Common Project Accounts**

Paper CERN-RRB-2008-006

#### **P. Geeraert, CERN Finance Dept.**

J.Engelen introduced this item by reminding delegates that the LCG project was helped by voluntary contributions by various participants and that is what is discussed in this item.

P.Geeraert then reviewed the paper. In terms of budget, expenditure has now reached a total over the years of 80.6 MCHF, an increase of some 18 MCHF since the last C-RRB, a more or less constant increase now. The funding agencies contributions went from 3.8 to 5.5 MCHF since the last C-RRB and the expenditure also increased from 3.6 to 4.6 MCHF. The sum of this account is now in balance, largely thanks to INFN, so we have recovered from the situation of last time.

There were no questions so the chairman moved to the next item.

## **6. Report from the C-RSG**

**D.Espriu**

Presentation CERN-RRB-2008-055

J.Engelen reminded the delegates that a dedicated scrutiny group, the Computing Resources Scrutiny Group, chaired by D.Espriu had been formed and this report covers how they intend to proceed with their mandate.

D. Espriu reported on the C-RRB meeting of 15<sup>th</sup> April at which he had made a presentation about the purpose of the C-RSG to help the C-RRB make well-founded budget decisions each autumn. The starting point is the request information presented at the spring C-RRB meeting and any guidance that the C-RRB cares to give. From that moment the RSG enters into a sustained dialogue with each experiment and with the LCG project, seeking to understand to what extent the computing resource requests are well motivated.

As specified in the WLCG MoU (Annex 9, items 5 and 6) every year the C-RSG shall scrutinize

- i. The resource accounting figures for the preceding year
- ii. The use the experiments made of these resources
- iii. The overall request for resources for every experiment for the following year and forecasts for the subsequent two years

The C-RSG will also examine the match between the refereed requests and pledges from the Institutions and make recommendations concerning apparent under-funding. The C-RSG is not expected to perform the role of mediator between the experiments and the resource providers.

The inaugural meeting of the C-RSG was held on 10th December 2007 chaired by J.Engelen where he asked the experiments to present their computing plans as being fundamental background information for the group. There was also a statement from F.Forti of the LHCC LCG referees to ensure mutual understanding between them and the C-RSG.

The second meeting of the C-RSG was held on 20th March to review their mandate, decide on a work plan, set priorities for 2008, establish a meeting calendar and discuss several practical matters.

The group also plans to look at the quality and effectiveness of the monitoring and accounting tools and started this at their second meeting.

Finally D. Espriu presented to the C-RRB the decisions taken at the meeting of 20<sup>th</sup> March:

- Two referees were appointed for each LHC experiment;
- J. Knobloch will act as liaison with the LHCC and it is hoped to share material and possibly some meetings with them;
- The C-RSG Chairman is arranging to meet with experiment spokesmen during April to arrange practical matters for the reviews;
- The C-RSG plan to meet at the end of April to take the results of the C-RRB meeting into its work. It will also agree on common measures for the reviews and assign work packages;
- The C-RSG then plan to meet in June to review their progress and also see the results of the Common Computing Readiness challenge;
- The C-RSG will decide the date for one or more Autumn meetings when they see how the LHC is performing bearing in mind that they have to report to the C-RRB meeting of 11<sup>th</sup> November.

D. Espriu concluded his report by saying that the message is simple – the scrutiny group for the LHC computing is working and that he hoped the board find their recommendations useful.

J. Engelen asked if there were any questions for clarification to the chairman of the C-RSG or recommendations or desiderata to communicate? There being none he thanked the speaker adding that we looked forward to his report at the next C-RRB.

## **7. Status of Resources and Financial Plan S. Foffano, CERN**

Paper CERN- RRB-2008-039

Presentation CERN- RRB-2008-040

S. Foffano began by telling the delegates that we must work closely in 2008 in preparing for 2009, and that from last year's comments and questions she wanted to remind delegates of the timescales and expectations. She also announced they will be changing the look and feel of the LCG web pages over the next few weeks to make it easier to find information. She then reviewed the conclusions and key messages from the Autumn C-RRB meeting (slide 3). The situation of Tier-2 federations reporting their status has still not stabilised and as regards sites confirming their 2008 pledges and providing values for future years we need to work together to improve this reporting. She pointed out that, compared with the Tier 1 sites, she has less contact with the Tier 2 sites, where she uses the contact names out of Annex 2 of the MoU, and requested to be told if these had changed.

### **7.1 Signatures of the WLCG MoU**

S. Foffano reviewed (slides 4 and 5) the status of signatures of the WLCG MoU. Since October 2007 the following federations had signed:

- Finland (T1+T2)
- Norway (T1+T2)
- Sweden (T1+T2)
- Estonia (T2)
- Hungary (T2)
- Republic of Korea (T2)
- Turkey (T2)
- Germany: LMU and ALU (T2)

Of the 11 Tier-1 Centres, all had signed including the Nordic Data Grid Facility (NDGF) following the signatures Finland, Norway and Sweden, Denmark having already signed. Currently they are waiting for Uppsalla (Sweden) to sign.

As regards outstanding signatures they were hopeful to have the Austrian T2 soon, the Czech republic signed yesterday, Canada East and West signed on 10 April and the only remaining T2 to follow-up on was Brazil.

### **7.2 LCG Phase 2 Budget at CERN**

S. Foffano then showed in slides 6, 7 & 8 the CERN funding and planned expenditure for 2005-2008 and 2009-2012 of the LCG project at CERN in MCHF. It was hoped to carry over about 1.3 MCHF from phase 2 of the LCG project. The figures for 2007 changed a little from the last C-RRB as a few people were moved from CERN to EGEE funding. At the end of 2007 we bought material that we had thought to spend in 2008.

### **7.3 Resource usage and accounting**

S. Foffano then showed graphs (slides 9,10) giving a summary of the CPU Time, Disk and Tape Storage accounting from January 2007 to February 2008 obtained by summing up all external Tier-1s. The graphs showed the installed capacity, the pledged capacity and the resources usage. She noted that from April 2008 we will be using the 2008/9 pledges and that we will monitor what happens through the management board. It is not too early to be planning future procurements given the problems seen at many sites.

S. Foffano turned to accounting for Tier-2s (slides 11 to 14). She pointed out that the data comes from the LCG accounting portal where sites must correct their data themselves. On the point on slide 11 that monthly reports are circulated for comments she requested help to find the right people to receive these circulations. As regards the 5 countries requiring follow-up on their accounting reporting she has already had exchanges with all of them. On slide 13 she showed the Tier-2 accounting for the top 10 sites from September 2007 to February 2008 but remarked that it may be a different 10 sites next time round.

#### 7.4 Computing capacity pledges

Slide 15 showed the resource pledge responsibilities where S.Foffano emphasised what is expected of the sites and on what timescale. She reminded delegates that by signing the MoU their organisations are committing to providing information for a 5 year timescale. The Autumn 2008 meeting is expected to confirm the pledges for capacity to be available from April 2009. Sites do not, however, have to commit pledges for the next 5 years but only for the coming year with the next 4 years being their best planning estimate. She will come back with the full planning picture at the next C-RRB so will be contacting sites over the next few months.

Slide 17 showed the evolution of the pledge balance from 2008 to 2012 where, since the last C-RRB, the balance has got worse in 2009 though there are slight improvements in 2010/2012. For 2008 the situation is fairly well understood and should be alright given the planned activities. It is hence important to work on 2009 where, she emphasised, we want your input for the next meeting.

In conclusion (slide 18) S. Foffano added that:

- For Tier-1 and Tier-2 accounting reporting we want to build a complete picture.
- If delegates take only one message home it is that we need input from all federations on their future pledges and she has set a deadline for receiving this of two weeks before the next RRB meeting.
- We have also heard that the Resource Scrutiny group will be meeting before the RRB so hopefully this data will be useful to them as well.

#### Discussion

J. Engelen thanked S. Foffano for this very quantitative report and opened the floor for any comments or questions.

M. Pripstein (NSF) opened by saying he did not understand the role of the scrutiny group as you try to get pledges from the different countries and federations and asked if the scrutiny group is supposed to validate them or say these MoU's are insufficient or asking for too much ? He wondered where the 'buck' or the 'euro' stops. J. Engelen replied that, as the RSG chairman had pointed out, the group is going to look into the use of the resources, whether they are correctly and sufficiently used, put in place by the participants of the collaborations. At a certain point there should be an interaction between what the scrutiny group finds and the pledge process. The first task of the group is, on the basis of what is pledged and available, whether the use of that is correct and justified – is it indeed LHCb that is using the LHCb shares. The interaction with the pledging process still has to take place but what this board wants is for the group to tell us that what you have put in place is correctly used by the experiments for the benefit of LHC data analysis. M. Pripstein then asked if the scrutiny group, as well as saying resources are correctly used, will also say if there enough resources ? J.Engelen replied that if that is what they find they can definitely comment on that.

J. Seed (UK) made a couple of comments. Firstly, on the pledges, the report seems to summarise that the 2008 situation is understood implying that it is not a major issue yet we have a 40% lack for ALICE which must be a huge problem for them. She thus had difficulty understanding why lower deficits in the future are a worry and wondered where we should really be worrying and concentrating our efforts. Her other comment related to the additional infrastructure for the computer centre – what sort of magnitude are we talking about for this additional infrastructure and is that already approved in the medium term plan or is it an additional request this year ? J.

Engelen said he would invite the IT department head to comment on the second point if he wished and suggested that the ALICE spokesman respond on the first point. He added that as far as the infrastructure development to fulfil the Tier 0 requirements was concerned a process has started at CERN to how best provide this infrastructure. It was fairly clear that the computer centre as-is will not be sufficient. The investments required will have to go to the Finance Committee of course but that has not happened yet. As far as the actual financing it is not the case that there is a large amount that will impact the CERN budget – it is foreseen, reasonably speaking.

W.von Rueden, head of IT, added that we foresee sufficient resources as the planning done by Les Robertson at the time included money for the infrastructure needed for the time when we ran out of steam. The problem is that the process takes 3 years so we will not achieve a new infrastructure for 2010. J.Engelen closed this point by saying that discussions are ongoing at the CERN management level.

J.Engelen then switched to the question on the shortfall for ALICE for this year where he understood the requirements were based on a different LHC schedule for this year when a heavy ion run, now excluded, had been planned so the situation will not be as bad as it looks. However this does not mean that for future years the ALICE problem has been solved. He invited the spokesperson to comment. In reply J. Schukraft, ALICE spokesperson, said the problem of ALICE had a simple reason – the funding agencies are supporting ALICE very well but the key they use for allocating computer resources does not reflect the particular requirements of particular experiments. The amount of computing needed per person, usually used as the key, is bigger in ALICE than in the other experiments due to the nature of their physics leading to very complicated events with a lot of information and which need more computing power. They have been aware of this shortfall since a long time and are addressing it in 3 ways. Firstly they are trying to get additional resources and have recently made some agreements, such as in the US, which will help. Secondly they are suggesting the funding agencies consider the balancing of their resources to better match the experiment requirements and finally they are telling their computing people they will have to live with a reduced amount of resources though not at the level of 40-50%.

J.Engelen then asked for other questions to S.Foffano on the subject of resources. M. Turala (Poland) then asked about the plot showing usage of cpu against pledges which he thinks is not simple to understand. It shows low numbers for the Polish federation but when he looked into this he found that not enough jobs are being submitted by the experiments and that these plots are somehow two numbers convoluted together namely the availability of resources and demand from the experiments and that resources were not being used fully. S.Foffano thanked him for the comment adding that what she had shown here was from the accounting which has to be counterbalanced by the reliability and availability reporting that Ian Bird mentioned in his presentation to see the complete picture. She thought it important that sites look individually at their statistics to really understand and that perhaps we should try and present this differently next time. M.Turala added that experiments should also look at these numbers.

V. Guelzow (DESY) said that reporting accounting data is always delicate as no-one knows how to interpret it. In his view the Tier 2 accounting reports from September to February are more a sort of a trend than full information as they have huge error bars and some sites are missing for various reasons. He would appreciate if these slides could somehow be footnoted to this effect. I. Bird replied that he was correct but that if we did not publish these numbers people would not take them seriously and we will never get the full picture. There are certainly some sites not yet reporting and we would push to get the full picture but it is a complicated scenario – we have pledged capacities, installed capacities, delivered capacity and availability. We do not yet know what the workload being run is and if it is trying to use the full capacity. We must get all the reporting in place and validated so I encourage sites not yet reporting to do so and all should check each month that the numbers coming out in the report we publish really match their reality. By the end of this year we need to be able to say we understand how the resources are being delivered. V.Guelzow fully agreed that we do have to have reporting on this but we do have some ‘innocent victims’ not mentioned in the reports which may then have trouble later approaching their funding agencies so we do have to be a bit more careful, at least adding a footnote. J. Engelen said his point was well taken and that we still have to learn how to understand these numbers. He believed

that a body like the collaboration board could address this issue to see to it that we get more accurate numbers over time that are correctly used and they are certainly not meant to do any harm to anyone. S.Foffano completed this topic by saying that they had a meeting later this morning to address this issue and asked that when new sites appear that should be included in the accounting the LCG office be told as soon as possible.

T.Ekelof (Sweden) then referred S.Foffano to the bars in her plot of Tier-1 cpu, disk and tape January 2007 – February 2008 (slide 9) saying there seems to be an overcapacity both in the MoU and installed capacity by about a factor of two over what is used since July 2007. I. Bird replied to this clarifying that the bars in the plot come from the accounting system so if some sites are not reporting they will not appear here. There is an overcapacity but it is part of the ramp-up for this year - a ramp-up has been planned for many years so you do not have to buy all your capacity now at the last minute. T.Ekelof then asked if you also have accounting reporting from the experiments at the Tier 1 ? I. Bird replied that the experiments that have verified their internal numbers against the accounting system confirm it reports what they see. T. Ekelof asked if the effect of the sites that were not reporting was marginal to which I. Bird replied that there were some large Tier 2 in the US that are currently not reporting but if there was an underestimate in the reported accounting it was very small.

J.Engelen added that this point has been discussed before and one answer is indeed the ramp-up and another is that some of the cpu underusage was due to lack of storage capacity. He proposed we wait for real data when he was sure the bars (of used time) would hit the curves (of available time). W.von Rueden added that the fact we don't have beam yet might be influencing this because we only have simulated data and cosmics and when we have real data coming in the situation will change very quickly. Also you cannot install huge capacity increases from one day to the next – you have to make this work.

A Van Rijn (Netherlands) then asked if the project is considering to change the unit of measurement for cpu from Kilo specint 2000 (KSi2K) to Kilo specint 2006 (KSi6) because he is getting confused in his procurement process calculating what is what. I. Bird replied that they were thinking of changing – the KSi2K is no longer used by the manufacturers and we should move to KSi6. However, this is not a simple change and there is a group looking at benchmarking to understand how this scales with our applications and we hope to make a report in May on how to make this transition. A Van Rijn asked if there was already a rule of thumb between the two measurements to which I. Bird said there could be one coming in May.

T. Ferbel (USA) then referred to slide 16 (pledge balance in 2008) making what he thought was the obvious comment that he wanted to be sure that S. Foffano and the scrutiny group do not drop their interest when the sum goes to zero. He made the point that the sum on the right hand side is totally useless because the funds are not exchangeable. He did not understand why those numbers were listed and thought that what was important was what each experiment had because different countries have different sharing of funds so in some places, for example, ALICE funds come from the same agency as CMS funds but that is not uniform so the important thing is to show the separate experiments and to exercise your strength in making sure that they come up to standard. S. Foffano replied that she agreed and said that the detailed work is happening on an experiment by experiment basis and it is mainly for the presentation and to send out some warning bells that the figures are set out in this summed up way.

V. Guelzow (DESY) then returned to the budget numbers where he assumed there was nothing for the new CERN infrastructure implied by what I. Bird said. He asked if we could be given an idea of the class of problem we will be running into in 2010 in terms of energy, space and so on – is it sufficient to put a container outside or do we need much more ? J. Engelen replied that this problem is not CERN only and so he would be hesitant to discuss the CERN issue here in detail other than confirming what was said before, that I. Birds predecessor had already planned for this growth, produced quantitative reports and put this information on the table. The implementation of that will not be impossible from the standard budget that is forseen but the technical process as to how we make the decisions in house has not converged yet.



**8. Summary****J. Engelen**

J. Engelen thanked the participants for this substantial and very lively discussion which he considered to lead to the summary that this enormous project, thanks to you, is becoming a very important reality in the LHC project, that we are looking forward to exercising the system on real data and that all the conditions to do that in the coming months are there.

<p>The next RRB meeting in 2008 is scheduled to take place at CERN on <b>Monday 10<sup>th</sup>, Tuesday 11<sup>th</sup> and Wednesday 12<sup>th</sup> November 2008</b></p>
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H.Renshall  
10 June 2008