

## R2E Review – November 2011

Please find below a first proposal of review sessions, some names for secretary, candidates for chairs and external reviewers, as well as a list of questions to be addressed during the review. I suggest that the session secretaries:

- go through the first list of questions and update, add accordingly
- then iterate this between the other sessions in order to assure consistency
- make a first proposal of talks required for the sessions (including speakers) – see tables

### Suggested Date:

- week 44: 31.10. – 4.11.

## Draft Agenda

### Introduction: Aim of the review + Performed Actions

- expectations from the management (Steve)
- what general questions have to be answered for R2E (Markus)
  - o what improvements are already implemented in the LHC and how much did we gain (important for failure study)
  - o xMasBreak 2011/12 what do/can we do and what's the impact on 2012 Operation
  - o next xMasBreak + Long-Shutdown 1
  - o strategy beyond

Title	Speaker	Key Words	Length

### Session – 1: Calculations & Monitoring

(secretary, chairs + reviewer candidates: M. Calviani, A. Ferrari, ESA, + ?)

- LHC Operation: past and future operation (luminosity, loss distribution).
- Vacuum & Beam-Gas: measured densities and predictions for the coming years and how does it compare with calculated monitor predictions?
- Overview of LHC radiation levels and extrapolation.
- Overview/results of additional FLUKA calculations.
- UX15/UL leakage: analysis and outlook
- Calibration improvements and summary of calibration values (including references/reports).
- How does the monitored radiation levels compare to the predictions and extrapolations?
- How 'performing' is the installed shielding (measurements + calculations)
- Is the monitoring coverage sufficient and what long-term developments are required?
- How much are we affected by thermal neutrons?
- How big are our uncertainties in predicting radiation levels (tunnel, shielded areas)
- Radiation levels in the UA63/67 (kicker equipment)
- Are there additional weak-points coming up (e.g., P4)
- ...

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### Session – 2: Radiation Testing & Equipment Failures

(secretary, chairs + reviewer candidates: G. Spiezia, J. Christiansen, F. Faccio, R. Gaillard, ESA, Montpellier, TRAD?, + ?)

- H4IRRAD the new test area.
- PSIRRAD the next step (could also go into calculations)?
- Availability of test facilities/areas.
- Summary of CNRAD test results and lessons learned – impact on LHC (test reports!)?
- Summary of PSI test results (including setups) and lessons learned – impact on LHC (test reports!)?
- Overview and analysis of 2010/2011 equipment failures.
- LHC/OP impact of SEE induced failures.
- How representative is our test strategy (PSI, CNRAD + H4IRRAD) for LHC conditions (shielded areas/tunnel)?
- What can we say about the observed uFIP failures, the expected failure cross-section and the need for mitigation actions?
- Final analysis of QPS failures, extrapolation with LHC operation (especially higher beam-gas densities) and mitigation plan.
- H4IRRAD radiation tests & consequences:
  - o power-converters
  - o safe-room equipment
  - o GTO test results and consequences for UA63/67 installation
  - o other tests
- 1<sup>st</sup> results and approach of outsourced radiation tests (TRAD or similar)
- nanoFIP status and implementation in user systems
- Other radiation tolerant developments/requirements for the LHC tunnel (present/upcoming)
- What about ‘hidden failures’: e.g., second stage problems caused from one equipment to the other (e.g., Ethernet switches)
- What about failures possibly attributed to SEE while being of other origin?
- ...

Title	Speaker	Key Words	Length

### Session – 3: Integration & Implementations

(secretary, chairs + reviewer candidates: A.L. Perrot, Y. Muttoni, S. Baird, + ext.?)

- Mitigation actions already implemented in the past year and their effectiveness.
- Safe-Room relocations: final strategy
- PAD/MAD: final mitigation approach.
- Shielding blocks: purchase status, storage and preparation
- Relocation actions per point/area: overview/preparation/planning/documentation.

- UJ14/16/56/76 and US85
- Shielding actions per point/area: overview/preparation/planning/documentation.
  - UJ14/16/56?, RR13/17/53/57 and US85
- What can be anticipated in the xMasBreaks/technical stops?
- Civil engineering requirements (for mid- and long-term actions), what actions come next?
- UJ23/87: long-term requirements/options?
- Analysis of most critical mitigation actions with respect to timing/accuracy/safety (overlap with safety session).

Title	Speaker	Key Words	Length

#### Session – 4: Power-Converter Radiation Tolerant Development

(secretary, chairs + reviewer candidates: Y. Thurel, G. Spiezia, R. Gaillard, ESA, Montpellier, + ?)

- observed failures during operation, H4IRRAD test results and respective outlook for next years of LHC operation
- status of conceptual design study of radiation tolerant power-converters
- status of conceptual design study of new FGCs
- 60A anything to worry about?
- component requirements and status with respect to ongoing/planned radiation tests
- strategy of component purchase, availabilities and storage
- is the development/testing/prototyping/procurement strategy feasible and in line with LHC operation
- short-term patch-solutions versus long-term development

Title	Speaker	Key Words	Length

#### Session – 5: Safety Constraints & R2E Policy

(secretary, chairs + reviewer candidates: C. Jach, S. Roesler, J. Pedersen, M. Tavlet, T. Wijnands, + ?)

- Relocation actions: possible safety constraints and respective mitigation.
- Shielding actions: possible safety constraints and respective mitigation.
- Radiation protection and radiation safety constraints for both, proposed mitigation solutions, as well as final work implementation
- Organization of work-sites and safety responsibilities.
- Status of ECRs and safety documentation (certain overlap with session 3)
- Requirements for an efficient R2E policy.
- Strategy/Proposal to implement an LHC (later also for other accelerators) radiation policy.

Title	Speaker	Key Words	Length

## Session – 6: Alternative Solutions, Planning, Resources & Strategy

(secretary, chairs + reviewer candidates: K. Foraz, R. Saban, M. Brugger, + ?)

- Betatron cleaning in IR3: a long-term possibility and is it effective for IR7 R2E issues?
- Status and outlook for new horizontal/vertical superconducting links.
- Are our radiation test resources sufficient?
- Planning of mitigation actions (xMasBreaks 11/12 and 12/13 + LS1)
- How do we fit the actions into the LHC operation planning and what are our flexibilities in case the planning changes (plan-B)?
- Foreseen worksite planning and coordination.
- Resource (budget & man-power) status per work-package, update of next year's planning
- Activities/Resources overlaps during xMasBreaks and Long-Shutdowns, what is/can be done?
- Putting it together: input from radiation tests, LHC observations, mitigation actions -> what is the proposed/updated strategy?

Title	Speaker	Key Words	Length