Availability meeting Notes – July 14 / July 15, 2009

Marc Ross, Chair

Notes provided by Nick Walker. This summary was written by Marc and lists his conclusions.

Attendees: Carwardine, Elsen, Enomoto, Fukuda, Himel, Michizono, Paterson, Ross, Terunuma, Toge, Walker, Yamamoto, Yokoya

Presentation material by John Carwardine, Tom Himel and Ewan Paterson.

Indico meeting location: http://ilcagenda.linearcollider.org/conferenceDisplay.py?confId=3737

Note that the Availability Task Force has a dedicated area with ILC-EDMS where all material is posted in addition to the indico site.

NEXT Availability meeting: July 21 (2100 SLAC, 2300 Fermilab)/July 22 (0600 DESY, 1300 KEK) 2009. The KEK Accelerator Laboratory ILC Program review is scheduled on July 22 and many of the KEK attendees will be absent.

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The meeting consisted of a presentation by John Carwardine and 'subgroup 2' on engineering analysis of availability model simulation results.

Review:

The goal of the availability task force is to provide viable availability models for SB2009. These are to be presented at the upcoming GDE meeting "ALCPG09", Sept 29 - Oct 3, 2009 for review and comment by the GDE community at large. The models (possibly revised) will be submitted to the Project Director by the end of 2009 along with the recommendation that they become part of the ILC TDP2 baseline. It is important to note that the components of SB2009 which most strongly impact ILC availability are the ML single tunnel, the low power option and the two HLRF options (KCS and DRFS) and the task force work will be limited to these dominantly ML issues. *Work on combinations of SB2009 components and Reference Design – RDR - components, (for example a single tunnel high power configuration), will be very limited.*

Summary:

(What follows is perhaps more a set of highlights than a summary and reflects Marc's conclusions. See the Q/A listed in the Discussion section, below.)

John presented a three-step program:

1) analyze the downtime associated with a given kind of failure (or failure in a given region) – a) the time to repair, b) start / end effects (such as radiation cool-down and travel time) and c) beam operations recovery time. It is important to note that only a small part of the downtime is attributable to the component 'time-to-repair' itself – the rest is due to logistics of moving people and equipment and to the 'transition' from operations to down and back to operations again.

2) divide 'failed' components into two basic categories to assist in further analysis and planning: a) low-tech components for which the MTBF is very well known based on a broad experience base and b) high-tech equipment, typically developed using native lab-based expertise, for which very little (perhaps nothing) is known about MTBF. John further divided a) into two sub-categories: a1) items that have an industrial MTBF basis (examples are flow switches, pumps, circuit breakers) and a2) items that have an institutional MTBF basis (examples are precision magnet power supplies, electromagnets, controls). This critical step will allow us to collect and apply accepted MTBF / MTTR values for a1) and a2). Much of the MTBF input used in Availsim is based on SLAC and Fermilab experience and by using industry standard performance we should be able to separate poorly deployed components from poor quality components. Finally –

3) analyze and understand how it all comes together and how the underlying assumptions affect the result.

Tom showed and walked us through the Availsim output 'spew' file. A full set of output is attached to the Indico agenda for the meeting. He provided (see 'resultsilc…') answers to some of John's questions directly.

Finally, Ewan showed three 'operations and maintenance models', focused on how the nominal three months scheduled downtime is best managed. Recent (last 10 years) experience has shown that a proper preventative maintenance program can cause a substantially improved availability.

Discussion:

(Key Q/A raised during the subgroup 2 presentation).

Q: How will we decide upon input MTBF entries for 'off the shelf'? What about the cost differential for using high MTBF components? How will the 'input entry gathering' process be organized?

A: We should strive for the best practice / best performance components and apply the appropriate cost differential. We should reject the poor SLAC / Fermilab performance, especially if it contrasts with light source performance. The task force has asked 'subgroup 2' to collect these numbers.

Q: How will we estimate the MTBF of 'cat 2' components (high tech, home built devices)?

A: A multi-pronged approach is needed. Ultimately, we will not have 'real' high tech reliability data before construction. We discussed: 1) using sub-assembly performance as a guide, 2) trying to desensitize the design to high tech equipment reliability – through overhead etc and 3) developing an 'evolving response' model. (A process most of us are familiar with).

Task force planning and homework:

At the next meeting we will have a report from the HLRF Technical Area Group (Shigeki / Adolphsen).

I have asked Chris to present klystron cluster scheme availability issues. Shigeki – who has made a series of DRFS presentations in the last week or so – will answer questions as needed. Tom and Marc agreed to submit questions to Shigeki ahead of time. He should be able to attend our meeting, although perhaps only for part of it (see the comment about the KEK Accel Lab review, above).

I believe two face-face meetings (~1 1/2 day elapsed time) would useful during this initial phase (up to ALCPG09) of the task force:

1) At Slac - with a focus on initial Availsim output and analysis.

2) At kek - with a focus on Hlrf and subgroup 3 activities. I am planning to be at KEK Aug 26-28.