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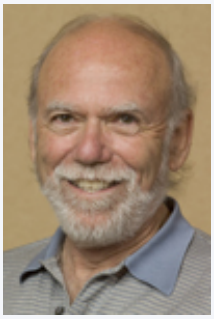
Director's Corner

4 January 2007

Cost Estimating the ILC Reference Design



Barry Barish

One of the most important goals of the ILC Reference Design is to understand enough about costs to provide a reliable indication of the project's scale and as importantly, to provide information and tools that will help guide the engineering design phase. It is a formidable challenge to prepare reliable cost estimating for a conceptual design that lacks detailed engineering designs, an agreement for the division of responsibilities and an industrialisation plan. Nevertheless, because it is so important to have good cost information as early as possible, we have spent enormous effort over the past year developing costing methodology, gathering costing data, vetting cost estimates and making tradeoffs to optimise cost to performance. Over the coming months, our design and cost estimates will undergo a series of reviews and revisions. The first of these reviews occurred at SLAC, just before Christmas, where we conducted what was basically an "internal review" of the complete ILC costing. In order to make this first review as realistic and valuable as possible, we invited a group of experienced external reviewers to participate. The external review team spent several days of their valuable time scrutinising our cost estimates and then giving us some very valuable outside reactions and comments.

The external reviewers who participated in the first GDE cost review were (left to right) A. Yamamoto, J. Marx, V. Soergel, T. Elioff and M. Yoshioka.

We approached the challenge of determining ILC costs internationally by forming a team of three experienced cost engineers, one from each geographic region. This team has led our international costing efforts through employing a "value" system methodology, much like that used for ITER. In this scheme, construction costs for each technical system are estimated using the lowest reasonable costs from a worldwide tender. In addition, institutional manpower for integration, installation, testing and so on is separately tallied as man hours, broken down by skill sets. This methodology does not include escalation, contingency or taxes that are different and differently accounted for in different countries. These costs can be added as appropriate to determine country or regional costs for particular work packages. Our external reviewers considered this methodology to be an " an appropriate basis" for doing our costing, and this represents a first important validation of the approach we are using.

Our costs first became available (internally) at the GDE meeting in Vancouver in July and an intensive period of evolving the design to optimise cost to performance has followed. The reference design configuration was frozen a month ago, after making a set of design changes (some are actually still in process). We presented the resulting RDR costs at the SLAC review, and our external reviewers in their closeout found the costing to be: " reasonable and appropriate as a first stage, and that it will serve as a solid foundation for future estimates of the cost as part of

the TDR (Technical Design Report) process and will help to guide future decisions."

On the other hand, they recommended that the "reason of the discrepancies between regional estimates should be well understood and that further effort for well defined common specifications shall be provided for further consistent cost-estimates." This is an area of concern for us, because differences in regional estimates can result from differences in specifications or requirements in making the estimates or can result from true regional differences. It will take more work, especially in the next engineering design phase to resolve some of these differences.

The external reviewers also commented on several other important aspects of the cost estimates, including how to refine these estimates in the future through the R&D and engineering design program. They make several valuable suggestions, including the importance of our presenting benchmarking and sanity checks, and our identifying areas where costs may be reduced through R&D and value engineering.

We very much value the time, energy, effort and especially the comments made by our five external reviewers. This was an invaluable first step for us in the process of bringing forward reliable and useful cost information with our reference design. The next step in this process will be a review of both the reference design and the costing by the ILC Machine Advisory Committee at Daresbury, U.K. from 10-12 January 2007.

I finally note that the reason I have given no actual cost numbers in this newsletter column is because the ILC cost estimates will remain internal and confidential, at least until the time of our Beijing meeting in early February.

-- Barry Barish