U.S. DEPARTMENT OF ENERGY

Office of Science

Department of Energy
Office of Nuclear Physics Report

on the

Annual Progress Review

of the

Super BigBite Spectrometer (SBS)

November 4-5, 2014

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Executive Summary

On November 4-5, 2014, the Department of Energy (DOE), Office of Science, Office of Nuclear Physics' Facilities and Project Management Division conducted an Annual Progress Review of the Super BigBite Spectrometer (SBS) program. The review was held at the Thomas Jefferson National Accelerator Facility (TJNAF, or JLAB) in Newport News, Virginia.

The SBS program provides equipment and detectors to measure of 3 of the 4 elastic nucleon form factors (GE(n) the electromagnetic form factor of the neutron, GM(n) the magnetic form factor of the neutron, and GE(p) the electric form factor of the proton) to a very high accuracy, which together may constrain theoretical values of the Generalized Parton Distributions.

The SBS program is divided into three phases (SBS Basic, Neutron Form Factor, and Proton Form Factor). The panel reaffirmed the conclusions of past reviews of the high value and significance of the measurements, stating that SBS takes excellent advantage of the 12 GeV upgrade to improve precision measurements at lower eQ^2 and establish new measurements at high Q^2. The new data will effectively triple the Q^2 range over which an essentially model-independent flavor decomposition of the nucleon form factor is possible. The panel noted the importance of understanding trigger cuts on the physics results. The panel also noted the impact of the proposed measurements is highest if all three measurements are done with similar accuracy and within a reasonable time. If one of the three measurements is not conducted, the impact will suffer considerably.

Significant progress has been made on all systems. In the most significant item, the magnet, the magnet yoke pieces have been machined, new race track coils are ordered, and new saddle coils will be ordered. Because the magnet will not be able to be energized to full field until it is installed in the experiment hall, existing field maps and low excitation results should be used to confirm the field early. It is strongly suggested that at full field, the region near the pole tip adjacent to the slot be well measured.

The Coordinate Detector (CDET) design is well along with a mechanical prototype assembled. The plan for shimming the scintillator slats could be very labor intensive. The proponents should consider using the mechanical prototype to develop a simpler technique for achieving the projective geometry. The schedule for this portion needs to be updated.

The data acquisition (DAQ) system appears adequate to handling the 500 MB/s data rates; however the parallel Fastbus approach, chosen for its financial advantage over flash ADC, appears to be complex. The panel strongly suggests the generation of a data event flow analysis to look for any bottlenecks. A panelist expressed interest in seeing an analysis of a realistic event stream, and noted the TJNAF simulations concentrate on individual processes or subsets of final states making it more difficult to understand backgrounds that will occur.

The collaboration and the European Organization for Nuclear Research (CERN) are commended on their steady and dependable production and supply of Gas Electron Multiplier (GEM) foils to be used in the front tracker. Prototype testing led to modest design changes such as and extra gas barrier for physical robustness, and improved etching techniques. The desired production rate of two modules per month has been reached. Spare modules are planned at 10% which the panel considers a minimum amount. Mitigation of workforce availability risk is encouraged through the addition of personnel capable of module fabrication. The provision of a complete spare plane is strongly encouraged.

Several pieces of the SBS system are external dependencies and are not covered within the project work breakdown structure, but were included in the review. The Hadronic Calorimeter (HCAL) design is finalized and has no apparent hurdles other than the large number of units (24,000 scintillator channels.) The Electromagnetic Calorimeter (ECAL) has been used before at TJNAF and is well characterized. Its main challenge is the radiation damage. The panel found the planned technique of continuous thermal annealing to be innovative, but had some concern about operating the photomultipliers at elevated temperatures required. The polarized He-3 target is critical to the neutron form factor measurements, and needs significant improvement. The panel found that integration of target milestones into the SBS monitoring process would be helpful.

The high level budget and schedule appear to be in good order. Critical path items in each of the WBS's were identified. The items correspond to high risk items but they may not be critical to the schedule because of the overall float. Costs of external dependencies were not presented; the budget is inadequate to have a dedicated polarized He-3 gas target, and it will be shared between Hall A and Hall D. An overall workforce plan was not formally presented. The workforce as discussed for individual WBS elements seems adequate.

The new project manager, appointed early in 2014, inspires confidence in the likely success of this project. The Laboratory and the collaboration work well together under an informal but effective organization. All recommendations from the last review were acted on, and comments were also implemented or responses given. Regular assessment of more finely-grained milestones, including both on-project and off-project dependencies, is suggested.

Recommendations

- The schedule for WBS2 should be updated to reflect the realities as presented, namely the change in CDet to a scintillator based detector, and the effects of financial constraints on the DAQ (need to use Fastbus instead of FADC). The revised schedule should be submitted to DOE by February 15, 2015.
- The collaboration should test the continuous thermal annealing in a realistic radiation environment with constant monitoring of the detector response, before finalizing the design of the detector.

Introduction

On November 4-5, 2014, the Department of Energy (DOE) Office of Science for Nuclear Physics (NP) held an Annual Progress Review of the proposed Super BigBite Spectrometer (SBS) program. The review panel consisted of five external peer review experts: Dr. Frank Maas (GSI), Professor Gerald Miller (University of Washington), Professor William Jacobs (Indiana University), Dr. Hank Crawford (Lawrence Berkeley National Laboratory), and Professor Ricardo Alarcon (Arizona State University). The review was chaired by Dr. Elizabeth Bartosz, Program Manager for Nuclear Physics Instrumentation. Other attendees included Dr. Gulshan Rai, Program Manager for Medium Energy Physics for the Office of Nuclear Physics.

Each panel member was asked to evaluate and comment on any relevant aspect of the SBS project. In particular, the purpose of this review was to assess all aspects of the project's plans—scientific, technical, cost, schedule, management, and environment, safety, and health (ES&H). The following main topics were considered at the review:

1. The significance and merit of the project's scientific goals;
2. The feasibility and merit of the technical approach for delivering the science, and the technical status of the project, including completeness of scope and fabrication progress;
3. The feasibility and completeness of the budget and schedule, including workforce availability;
4. The effectiveness of the management structure and the approach to ES&H; and
5. Other issues relating to the SBS project.

The two-day review was based on formal presentations given by the project team, separate follow-up discussions with the reviewers, and executive sessions. The second day included a question and answer session in which the project team responded to questions posed by the panel on the first day as well as a breakout session. The second day also included an executive session during which time the panel deliberated and prepared draft reports on their assigned areas of focus and ended with a brief closeout with the SBS project team and collaborators and laboratory management. The panel members were asked to submit their individual evaluations and findings in a "letter report" covering all aspects of the charge. The executive summary and the accompanying recommendations are largely based on the information contained in these letter reports. A copy of the charge letter and the agenda are included in Appendices A and B, respectively.

Significance and Merit

Findings:

The Super BigBite Spectrometer (SBS) program involves measurement of 3 of the 4 elastic nucleon form factors: GE(n), GM(n), GE(p). These form factors together may constrain the Generalized Parton Distributions. The measurements are aimed at achieving a very high accuracy.

The impact of the science program was presented, including specific examples on recent theory work from a Dyson-Schwinger-Equation approach or from a relativistic constituent quark model approach.

The issue of higher-order radiative corrections was not discussed.

Comments:

The elastic form factors are, theoretically, one of the simplest observables where scientists can confront their present understanding of the theory of the strong force with experimentally accessible observables in the non-perturbative regime of quantum chromodynamics (QCD).

While the region above Q^2=8 GeV^2 is unexplored using the method of polarization transfer, the proposed measurements below Q^2=8GeV^2 aim at substantial improvement in accuracy. A good understanding of many systematic effects will be essential.

A high precision measurement of nucleon form factors will improve dispersion relation calculations which connect form factors in space ($q^2 = -Q^2 < 0$ GeV^2) and time ($q^2 = -Q^2 > 0$ GeV^2) regimes. This has to be considered in the wider context of measurements of the time-like form factors of the BES-III experiment in the similar, but positive, q2 range and which yield a set of high precision data both for space and time-like form factors.

The examples of presented theory work were highly selective. Theoretical efforts could be stimulated by organizing workshops on this topic (like at the Institute for Nuclear Theory [INT]) focusing on the high Q^2 range.

The precision of the magnetic field needs to be known for different experimental aspects:

- Tracking of particles through the spectrometer in order to discriminate signal from background processes.
- Tracking the spin rotation angle of particles through the spectrometer in order to be able to extract the transverse polarization of the nucleon.
- Residual magnetic field (and more importantly field gradients) from the SBS magnet at the target location and its effect on the degree of target polarization
- The effect of the magnetic field on the exit beam line.

The impact of the proposed measurements is highest if all three measurements will be done with similar accuracy and within a reasonable time. If one of the three measurements would not be conducted, the impact would suffer considerably.

It is important to extend the Monte Carlo simulations to understand the impact of the trigger cuts on the physics results. The experimental simulations to date do not include analysis of minimum bias events.

The panel reaffirms the scientific importance of the proposed SIDIS measurement enabled by future enhancements to the SBS.

Recommendations:

- None

Technical Approach and Status

Magnet

Findings:

The 48D48 magnet yoke pieces have been machined for use as the SBS magnet.

New race track coils were ordered; an order for new saddle coils is in the award process. Acceptance tests of the yoke assembly have been performed at 200A with available (old BNL saddle and received race track) coils and supply.

A new 2200A power supply for the SBS magnet has been delivered to Hall A and acceptance tests will occur during a January Hall A access period.

The counter-weighted support structure for the SBS has passed design review and is in fabrication; the structure is positioned by a combination of hydraulic cylinders and Hillman rollers.

Design of the exit beam pipe magnetic field correction utilizes layers of shielding and two dipole corrector magnets whose sections and components can be changed to accommodate the different SBS settings; magnetic field simulations indicate that a requirement < 1000 G-cm on the integral field can be met.

An existing scattering chamber will be used; the vacuum snout is in fabrication; design of the field clamps is complete and analysis of pole shims is underway.

Comments:

The panel was pleased to see the progress on all aspects of WBS1 (and relevant parts of WBS2) with major pieces of equipment taking shape and undergoing acceptance tests.

The project standing has advanced enough to order new saddle coils as allowed by contingency; the new racetrack coils ease rotation of the magnet while the new saddle coils allow better proximity of the detectors to the magnet, increasing the solid angle.

While simulation tests of the exit beam pipe magnetic field compensation scheme meet the integral field requirement there is a concern about components which may affect the beam "size/shape"; beam transport calculations may be useful to ensure that any such effects are under control.

Several remaining WBS1(2) engineering/design deadlines are coming in the next months and early 2015 . It appears there are sufficient workforce resources to meet these deadlines due to a window provided by the current Hall A experimental installation/running schedule.

Full field excitation of the SBS will not take place before magnet installation in Hall A when in situ spot field measurements can be made to check fields against simulations. In the meantime, existing BNL field maps and low excitation results should be utilized to normalize simulation values, confirm magnet gap/fringe field conditions and estimate the impact on magnet/ beamline operation as well as the extraction of physics results. It is strongly suggested that at full field, the region near the pole tip adjacent to the slot be well measured.

Recommendations:

- None

Coordinate Detector (CDET)

Findings:

The new CDet will be used in all of the experiments discussed, the GEp, GEn, and GMn programs. The collaboration has decided on the scintillator implementation of the coordinate detector. The CDet is based on 5 mm x 4 cm x 51 cm bars of scintillator with a central hole into which a wavelength shifting fiber is inserted, with the WLS fibers connected to 16 channel MAPMTs.

CDet bars are arranged in groups of 28 glued together with appropriate spacers so that when placed in front of the ECal, they point directly at the target. The CDet is arranged as 2 layers in front of the ECal when in the GEp program, and as a single layer when placed in front of HCal in the GEn and GMn programs. CDet bars are molded as 1 cm x 4 cm x 51 cm slats, with a central 3 mm hole for the fiber, and then ground down to 5 mm thickness.

The CDet is not involved in any trigger.

The CDet has an A/D card for each NINO card that allows compensation for gain variations as discriminator threshold variations to make its response more uniform.

All MAPMTs for CDet have been procured and tested.

Comments:

The CDet design is well along with a mechanical prototype already assembled. The plan makes substantial use of existing equipment and contributed labor. This should make it possible to complete the project within the allocated funds.

The collaboration should consider having a reflecting surface on the non-MAPMT end of the CDet fibers.

The plan for shimming the scintillator slats could be quite labor intensive as it involves getting the mylar wrap flat and applying the tape for shimming. Workforce availability should be considered carefully

The proponents should consider using the mechanical prototype to develop a simpler technique for achieving the projective geometry, such as rotating entire groups of slats by mechanical means in the mounting structure.

Recommendations:

- The schedule for WBS2 should be updated to reflect the realities as presented, namely the change in CDet to a scintillator based detector, and the effects of financial constraints on the DAQ (need to use Fastbus instead of FADC). The revised schedule should be submitted to DOE by February 15, 2015.

Data Acquisition (DAQ)

Findings:

The DAQ system as currently designed uses three parallel sets of Fastbus operated in a round-robin fashion to speed up the acquisition.

The 5 kHz single electron trigger rate for the GEn program is different from the 200 kHz of the single electron rate in the GEp program because of differences in the targets.

The DAQ rate is ~500 MB/s, reflecting an event size of ~100 kB.

As of today, dead time losses would be on a very high level of 25%.

Comments:

The DAQ system appears adequate to handling the 500 MB/s rates, but requires a synchronization method for the triple FASTBUS parallel readout. In the context of designing the DAQ, simulations need to have a more realistic approach to event generation, including effects of "room backgrounds" and multiple particle events, in the time window of the trigger.

The effect of dead time losses on the physics results is unclear. It would be desirable to investigate the effects if it has not yet been done.

The panel strongly suggests the generation of a data event flow analysis for each of the 3 experiments that identifies bytes per detector (average and extremes) going onto storage for offline analysis, specifically to look for any bottlenecks.

Recommendations:

- None

GEM Trackers

Findings:

Results were presented from tests of several rear tracker prototypes carried out over the past two years.

Modest design changes in the rear tracker were made to solve problems seen in the prototypes: Extra gas barrier to prevent bowing of the readout plane; more attention in the CERN shop to etching readout planes to eliminate kapton shoulders covering part of the readout strips.

The R&D phase demonstrated that the performance goals for the trackers can be met.

Production has begun with five rear tracker modules now completed. Four are undergoing tests and behave well. These first five modules will be delivered to JLab soon, completing the first production milestone. In the past month, two modules were produced, meeting the desired production rate. Module construction and electronics procurement are well advanced for the front tracker. A workflow document was presented showing the workforce required for each production step of the rear tracker. There is a detailed fabrication and QA document, with well-defined acceptance criteria.

The decision has been made to use the MPD (INFN) readout. This is expected to have no (or positive) budget impact, but will minimize workforce costs to JLab.

The GEM electronics have a time resolution of 25 ns to help eliminate background hits. The forward tracker has a resolution of better than 100 microns to give momentum resolution of ~0.5%, far better than the energy resolution of HCal.

Component yields for the GEM trackers are high; GEM Foils were rejected at ~20% level. The present scope includes three spare modules.

Comments:

The collaboration and CERN are commended on their steady and dependable production and supply of GEM foils. The proponents have done an excellent job of transitioning from an R&D phase to production.

The rigorous testing of GEM components appears to yield an excellent detector.

Concerning the gain variation across the chamber that is reduced with increased gas flow, the team may wish to add water and oxygen monitors to the exit gas stream.

As modules are completed and delivered to JLab suitable personnel will need to be identified to carry out the testing at JLab. The team may find it beneficial to keep the present 5 production modules at UVa for a more detailed evaluation that may indicate improvements in fabrication for future modules.

Consideration needs to be given to the acquisition of adequate spare components. Spare modules and readout will not only provide backup in case of failure but will also allow reconfiguration or expansion for future physics programs. 10% is considered a minimum; the panel encourages the collaboration to consider increasing the number of spare modules.

The provision of a complete spare plane (four modules, and including electronics) is strongly encouraged.

The production workflow indicates that most of the module fabrication is carried out by two people, leaving the production flow vulnerable to illness or personnel turnover. Mitigation is encouraged by having other personnel capable of performing fabrication and QA processes.

The desired production rate of 2 modules per month has been achieved only in the past month. Production rate for the next set of modules should be carefully monitored.

The X-ray test set up should be completed expeditiously so that the early production modules can be tested under extreme rates, as similar to those expected in the experiments.

Recommendations:

- None

HCAL, ECAL, DAQ, Polarized 3He Target

Findings:

Detailed design of HCAL was completed in July 2014 and a “design review” is scheduled for December 2014. The HCal uses light guides that are laser-cut rather than injection molded because of the superior attenuation length of the material generated: 35 cm attenuation for the injection molded vs 300-400 cm attenuation length for the laser cut. Components for HCAL available at CMU include: extruded scintillator (from FNAL), wavelength shifter assemblies (from St Gobain) and final design light guides (CMU).

A working HCAL prototype (proto2) was completed in May 2014; timing measurements with a cosmic ray test stand indicate a timing resolution of about 340 ps was achieved.

The ECal consists of 2000 Pb/Glass bars requiring 2000 PMTs of which the collaboration has 6000 to choose from. The ECal is expected to suffer radiation damage that is to be corrected by running the detector at elevated temperatures for continuous annealing. A proof of principle concept for annealing the ECAL involves heating of the lead glass modules; a lab bench test setup indicates a damage reduction factor of nearly 60% can be achieved in ~ 8 hours with a temperature elevation to 225 ˚C.

The He-3 target is viewed as a system and is shared between Hall A and Hall C.

Comments:

The HCAL light guide choice of laser cut acrylic stock seems appropriate to avoid material and fabrication issues associated with injection molding techniques. While the initial HCAL timing resolution result is already better than the requirement, it will be interesting to see with the improved light guides the resolution more nearly matches the expected ~ 265 ps as calculated in detailed simulations. With module HCAL assembly scheduled to start in March 2015 it is important that the "design review" expected to be held in December serve also as a module mass production review. A preview of the status indicates many components on hand/fabricated with further fabrication and assembly procedures under good control.

The idea of continuous thermal annealing of the ECal is an example of innovative thinking that, if it tests out successfully, will make a significant improvement in the ECal operation. There is concern about operating PMTs at an elevated temperature, however. Implementation of the ECAL annealing scheme on the scale of the full detector assembly will no doubt take some further development; a several detector element test assembly operated and monitored in a beam/radiation environment may be the best way to confirm viability of the approach, including mechanical, temperature and readout stability issues.

The He-3 target is critical to the neutron form factor measurements. Monitoring progress in this dependency is essential. Some technical milestones in this project would be helpful to keep the SBS program on track.

Recommendations:

- The collaboration should test the continuous thermal annealing in a realistic radiation environment with constant monitoring of the detector response, before finalizing the design of the detector.

Budget and Schedule

Findings:

The high level budget and schedule were presented. Completion date for WBS 1 is expected at the end of FY 2015, 41% of the budget remains to be committed and 60% of the contingency remains. WBS 2 acquisitions and procurements are expected to be done by the end of FY 2015, 39% of the budget remains to be committed and 90% of the contingency remains. WBS 3 completion date is July 31, 2017, 34% of the budget remains to be committed and 100% of contingency is still available. Critical path items in each of the WBS were identified.

Critical instrumentation like electron and hadron calorimeters, polarized ^{3}He and high power hydrogen targets, are not contained in the presented WBS's.

The dependency costs (projects being carried out at outside institutions) were not presented although these projects appear to be on schedule.

For WBS 3, all major costs for the module fabrication are spent or committed; the major remaining cost is the readout electronics. Remaining expenditures for the readout electronics are well understood since electronics fabrication for the front tracker is underway in Italy.

Comments:

The items identified to be on the critical path correspond to high risk items in each WBS but they do not appear to be critical to the schedule because of the overall float. In WBS 3, the GEM effort has large schedule float and is highly likely to be completed well before needed.

The dependency costs (projects being carried out at outside institutions) were not presented although these projects appear to be on schedule.

An overall workforce plan was not presented formally. The workforce as discussed for individual WBS elements seems adequate to complete the project.

Recommendations:

- None

Management and ES&H

Findings:

A new Project Manager (PM) was appointed early in 2014.

As recommended in the last review the Project Management Plan was updated together with the Research Management Plan.

To keep track of the project the PM works closely with Hall A management and the collaboration through weekly meetings. Weekly meetings are also held between the Coordinating Committee and the PM with Hall A management.

No contracts to universities remain to be awarded.

For different subsystems a substantial amount of previously used material, like PMT-tubes, FASTBUS-modules etc. are being used.

The project team responded to all recommendations from the previous review.

Project activities adhere to the protocols in the JLab EH&S manual.

Comments:

The new project manager inspires confidence in the likely success of this project. He is clearly in touch with all aspects of the program, from the physics, through the infrastructure and detectors, and to the analysis of results. The Laboratory and the collaboration continue to work well together under an informal but effective organization.

While it is practical and cost effective to reuse material and components, it would be important to understand the expectations of the life-time of the components, for example phototubes.

Responses to the last review were acceptable, and all prior recommendations are closed.

The fact that current PMP contains a schedule issue with CDET suggests that management should monitor more closely the progress of both the on-project subsystems and the off-project dependencies through regular assessments of more finely grained milestones.

Recommendations:

- None

Appendix A: Charge Letter

The Department of Energy (DOE), Office of Nuclear Physics Facilities & Project Management Division is organizing an Annual Progress Review of the Super BigBite Spectrometer (SBS) for Hall A at the Thomas Jefferson National Accelerator Facility (TJNAF). As you are aware, the review will take place November 4-5, 2014 at TJNAF.

Each panel member is being asked to evaluate and comment on any relevant aspect of the SBS project. In particular, the purpose of this review is to assess all aspects of the project's plans—scientific, technical, cost, schedule, management, and environment, safety and health (ES&H). The following main topics will be considered at the review:

a. The significance and merit of the project's scientific goals;
b. The feasibility and merit of the technical approach for delivering the science, and the technical status of the project, including completeness of scope and fabrication progress;
c. The feasibility and completeness of the budget and schedule, including workforce availability;
d. The effectiveness of the management structure and the approach to ES&H; and
e. Other issues relating to the SBS project.

As Chairperson for the review, I can be contacted at (301) 903-1455, or E-mail: Jehanne.Gillo@science.doe.gov. The first day of the review will consist of presentations by the project team and executive sessions. The second day will include break-out sessions and executive sessions and preliminary report writing; a brief close-out will occur around 4:00 p.m. Preliminary findings, comments, and recommendations will be presented at the close-out. The panel members have been instructed to contact Pat Stroop at TJNAF at (757) 269-7553, or E-mail: stroop@jlab.org regarding logistics questions. Word processing and secretarial assistance will be made available during the review.

We greatly appreciate your efforts in preparing for this review. This is an important process that allows our Office to understand the project's plans and its readiness to proceed to fabrication. I look forward to a very informative and stimulating review.

Sincerely,

Jehanne Gillo
Director
Facilities and Project Management Division

Office of Nuclear Physics

Enclosure

cc: Robert McKeown, TJNAF
Joseph Arango, TJSO
Bradley D. Keister, NSF

Appendix B: Agenda

November 4-5, 2014

Tuesday, November 4 – Plenary Sessions in CEBAF Center L102

8:00 – 8:50	Executive Session
8:50 – 9:00	Welcome (McKeown)
9:00 – 9:30 (20+10)	SBS Science Update and Overview (Puckett)
9:30 – 10:30 (40 +20)	SBS Project: Cost, Schedule and Management (Jones)
10:30 – 10:45	Break
10:45 – 11:30 (30+15)	Integration (including all dependencies) (Keppel)
11:30 – 12:15 (30 +15)	WBS 1 – SBS Basic: Magnet and Infrastructure (Wines)
12:15 – 1:30	Lunch (Executive session – Room L102)
1:30 – 2:15 (30+15)	WBS 2 – Neutron Form Factor: CDet (Khandaker)
2:15 – 3:00 (30+15)	WBS 3 – Proton Form Factor: GEM (Liyanange)
3:00 – 3:30 (20+10)	DAQ: VME and Fastbus (Cisbani)
3:30 – 4:00 (20+10)	Background MC – all experiments (Riordan)
4:00 – 4:15 (10 + 5)	Summary (Jones)
4:15 – 4:30	Break
4:30 – 7:30	Executive session
7:30	Light Reception, followed by Dinner – CEBAF Center Atrium

Wednesday, November 5 – Plenary Sessions in CEBAF Center L102

8:00 – 9:00	Q&A
9:00 – 10:30	Breakout: Magnet/Infrastructure/Integration **(Room B207)**
9:00 – 10:30	Breakout: GEM and Other Detectors **(Room L102)**
9:00 – 10:30	Breakout: Project Management **(Room F224-225)**
10:30 – 1:00	Executive session
12:30 – 1:30	Lunch (Executive session – Room L102)
1:30 – 3:00	Executive session
3:00	Closeout