

BRIDGE OWNERS FORUM

MINUTES OF MEETING BOF 48: TUESDAY 26 JANUARY 2016 AT THE BEVES ROOM, KING'S COLLEGE, CAMBRIDGE

PRESENT

Campbell Middleton	Chairman & Cambridge University Engineering Department (CUED)
Nick Burgess	London Underground
Graham Cole	ADEPT
David List	Large Span Bridge Group
Rob Dean	Network Rail
Richard Fish	Technical Secretary
Tomas Garcia	HS2
Keith Harwood	ADEPT
Jason Hibbert	Welsh Government
Rod Howe	Canal and River Trust
Neil Loudon	Highways England
John McRobert	Transport Northern Ireland
Jacqueline Mynott	CSS Wales
Stephen Pottle	Transport for London
Sakthy Selvakumaran	CUED
Paul Thomas	Railway Paths Ltd.
Paul Fidler	CUED

Introduction

The Chairman welcomed everyone to BOF 48, noting that the date coincided with Australia Day marking the founding of the “colony” in 1788. He also introduced CUED’s Sakthy Selvakumaran who was taking a PhD and had also been recognised as one of the 30 most influential people under 30 in Europe.

1. Apologies

Apologies had been received from the following:

Huw Davies Sustrans

Liam Duffy	Transport Infrastructure Ireland (TII; was NRA)
Wayne Hindshaw	Transport Scotland
David MacKenzie	SCOTS
Paul Monaghan	LoBEG
Eoin Nagle	Irish Rail

The Chairman noted that Mark Atkinson from Northern Ireland Rail was not present and noted last meeting's point that his invitation to join BOF would be withdrawn. The Chairman also noted that no response had been received from Steve Berry at DfT.

2. Previous Minutes – BOF 47: 3rd November 2015

Item 14: Replace “*would represent Network Rail at the former.*” With “*was the new Head of Structures at Network Rail.*”

Rob Dean reported that Nick Tedstone was the ex Route Asset Manager for the Wessex Region and also that Richard Frost had recently left Network Rail.

With this correction it was agreed that the minutes could be uploaded to the BOF website.

ACTION 27: Paul Fidler

3. Actions from BOF 47

References in the text below refer to the numbered actions on the BOF 47 Action Sheet. Boxed reference numbers below relate to the BOF 48 Actions:

Action 1, Temporary Bridge AIP Guidance:

Neil Loudon has yet to confirm how much of his BOF 46 presentation can be uploaded to Members' area of the BOF website.

ACTION 1: Neil Loudon/Paul Fidler

Action 2, Temporary Bridge AIP Guidance

Neil noted that Highways England had been working closely with Cumbria CC over temporary bridge options following damage to bridges during recent flood events. He noted that specific HE guidance had been delayed as another temporary bridge supplier was now in the market. Suppliers were now:

- Mabey
- Janssen
- Beaver
- Retro (new)

Neil confirmed that HE were attempting to de-commercialise AIP guidance, including the use of generic Departures from Standard. They were also in discussions with suppliers over Eurocode compatibility but continued to have concerns with regard to element loading history. Rob Dean noted that Network Rail were working on similar lines with respect to Standards and derogation processes. Rob also reported that Network Rail had received some questions over the height of parapets on temporary bridges which was less than that required for a permanent solution. Temporary bridge suppliers had argued that the risk was lower as the bridge would only be in place for a relatively short period of time.

Rod Howe reported that Canal and River Trust had ordered a temporary bridge over the canal at Elland and had contracted with Mabey who had prepared all drawings and specification although with no formal AIP process.

Sakthy Selvakumaran commented that Crossrail had employed temporary bridges but had required suppliers to provide certification amounting to a Category 3 check.

Neil Loudon reported on the situation at Pooley bridge, one of the high profile structures recently damaged; whilst there had been some delays due to land issues, it now seemed likely that a temporary bridge would be installed on condition that a design competition would be held before deciding on a permanent replacement bridge, taking into account local feelings and the fact that the site was part of a National Park.

The Chairman commented that lessons, in terms of process, should be learned from recent flooding and bridge damage for use in the event of future similar events. He then prompted discussions on a) how older bridges should be replaced, either sympathetic to the original style (albeit often disguising structural form but generally favoured by Historic England) or in a contemporary form, reflecting current style and materials and b) the benefits or otherwise for holding design competitions for new bridges.

With regard to competitions, Stephen Pottle noted that very little guidance was available and that entries in competitions tended to be led by architects. He suggested that BOF could take on a role providing engineering guidance especially covering buildability, maintenance and whole life costing. Such guidance might preclude “silly” ideas reaching the latter stages of a competition. He had seen some IABSE guidance and agreed to provide a link to their relevant website page.

ACTION 2: Stephen Pottle

Richard Fish reported how he had been commissioned to write a maintenance manual for the New Wear Crossing in Sunderland but only after it had won that design competition. It would have been better to have had that as part of the judging criteria.

Tomas Garcia pointed out that HS2 had also had concerns over the outcome of design competitions, especially with respect to dynamic performance which was a key criterion for high speed rail and should be central to making a decision rather than as an afterthought.

Neil Loudon agreed that a review of engineering criteria would be helpful and Keith Harwood agreed to consult Arup's Naeem Hussain and Flint and Neil's Ian Firth for their views on the matter.

ACTION 3: Keith Harwood

Sakthy Selvakumaran noted that recent RIBA competitions had embraced whole life costing, maintainability and green issues. The Chairman agreed to locate RIBA guidance.

ACTION 4: Chairman

Action 4, Atkins Study into Bridge Deck Water Management:

Neil Loudon noted that the report had now been issued to BOF members and some had returned comments with the overall view that the report had not progressed the topic as much as had been hoped.

Graham Cole agreed that the report had not been overwhelming in terms of its contribution to the subject and in fact there were some significant omissions. He advised that the report should *not* be added to the BOF website.

Rob Dean noted that the report was focussed on highway bridges and that rail bridges were not immune from water based problems. Neil pointed out that the brief had been centred on highway bridges but expressed disappointment that the Study had not picked up the earlier TRL work which had been supported by CSS through Steve Pearson (ex Derbyshire CC). He was, however, still in discussion with Atkins and would feedback the above points from BOF. The Chairman decided that the report should be posted only on the members' area of the BOF website.

ACTION 5: Paul Fidler

Richard Fish proposed a facility on the website that would allow BOF members to "score" reports which would help to show their relative value to the bridges community. The Chairman supported this idea and agreed to explore how this might be done.

ACTION 6: Chairman/Paul Fidler

A discussion followed on whether access to the members' area of the BOF website should be extended to all bridge owners, especially local authorities. It was generally agreed that the present arrangements should remain as other bodies are kept informed by other groups such as the ADEPT Bridges Committee.

Action 5, Guss Asphalt Surfacing:

Neil Loudon reported that the M5 Avonmouth Viaduct was suffering from a loss of skid resistance and a longitudinal crack in the surfacing which had been attributed to reflective cracking due to the lively nature of the box. John McRobert suggested that the surfacing was thicker than had been used on the Foyle bridge and might therefore be more susceptible to cracking.

Stephen Pottle and Neil Loudon reported that their respective organisations were working on the use of tagging technology (supported by the asphalt industry) to monitor performance by embedding remotely accessed sensors in the surfacing.

Action 7, Hidden Defects in Bridges: Transport Scotland:

In Wayne Hindshaw's absence, this item was deferred to BOF 49.

ACTION 7: Wayne Hindshaw

Action 8, Premature Bolt Failures:

David List reported that he had checked with Barry Colford who had advised that a FETA Board report in the public domain was accessible. David also noted that he emailed a paper on bolts on the Tamar Bridge for information.

Actions 9, Leadenhall Buiding Bolts:

In Paul Monaghan's absence, this action will be carried forward to BOF 49.

ACTION8: Paul Monaghan

Action 12, BOF Grand Challenges Document

Richard Fish proposed the following process for developing a new Grand Challenges (or similar) document:

- All to review existing document and/or suggest topics for inclusion.
- Richard Fish to prepare draft for discussion at BOF 49.
- New document to be launched at or around the time of BOF 50.

ACTION 9: All/Richard Fish

Action 13, Tagging Technology

Neil Loudon presented Highways England's current research and development activity with regard to active and passive tagging, including ongoing work on pavement condition and deterioration.

Stephen Pottle noted TfL's approach which included other assets and was about to identify ways of enabling public feedback through the use of QR codes, possibly linked to advertising and the prospect of becoming self financing. With respect to learning about state of the art research, Stephen suggested that a future BOF might include a visit to Cambridge University's Institute for Manufacturing.

ACTION 10: Chairman

Tomas Garcia reported that HS2 were developing a system of tagging bridge elements so that inspectors could accurately identify locations of defects. Rob Dean noted that Network Rail were looking to solve this issue by providing inspectors with geo-referenced iPads so that they knew their exact location. Nick Burgess stated that LUL's approach to this problem was to install RFID tags along the line to provide precise locations. Rob also described a European GSI initiative to consider tagging benefits across the sector. He agreed to provide an update at BOF 49.

ACTION 11: Rob Dean

Sakthy Selvakumaran noted that tags had been incorporated into Crossrail construction for long term monitoring but there were concerns about the robustness of the units. Stephen Pottle understood that other tags had been cast into large concrete pours to allow accurate control of curing times.

Action 14, Technical Approval Guidance on Phased Works:

Neil Loudon reported that Highways England were reviewing this matter in the context of the forthcoming revision of BD2. This would also include issues associated with specific structures such as sign gantries where connections and attachments may not be receiving sufficient scrutiny. Rob Dean sympathised with this issue as Network Rail were having to address similar concerns.

Stephen Pottle noted that TfL had developed guidance into the approval process for phased works and agreed to make this available.

ACTION 12: Stephen Pottle

Action 15, Parapet Research and Testing:

In Wayne Hindshaw's absence this item was deferred to BOF 49.

ACTION 13: Wayne Hindshaw

Action 16, Parapet Research and Testing:

Rob Dean noted that the RAIB report into the Froxfield incident had now been published. The Chairman suggested that a link should be added to the BOF website.

ACTION 14: Paul Fidler

Nick Burgess was concerned over the possible consequences of the report due to the recommendations on the use of brick parapets. Rob Dean replied that the use of R_{ALARP} principles still applied but there was a link to the 2003 DfT report on vehicle incursions which followed the Great Heck incident. Paul Thomas asked about the Oxshot incident: Rob replied that Network Rail were also attempting to record all near misses such as identified through scuff marks on parapets. He agreed to update future BOF meetings of developments on this and related parapet topics.

ACTION 15: Rob Dean

Action 17, Scottish Road Research Board

In Wayne Hindshaw's absence this item was deferred to BOF 49.

ACTION 16: Wayne Hindshaw

Action 18, De-icing Materials:

David List noted that he had emailed some reports on this subject from the Big Bridge group.

Action 19, BOF Subscriptions:

BOF subscription invoices were issued at the meeting and would also be emailed to BOF representatives. The Chairman asked for these to be processed for payment.

ACTION 17: All

It was noted that the HS2 invoice had not been prepared. The Chairman agreed to ask Anne Debenham to address this and other administrative issues

ACTION 18: Chairman

Action 20, BIM:

Stephen Pottle reported on the recent initiatives within TfL which centred around a Common Data Environment (CDE); this system is wider than just the supply chain and also requires designer input. A number of year long Pioneer Projects are underway. CDE is web based and will be able to read files from many software sources.

The Chairman questioned readiness for the Level 2 BIM compatibility requirement due to be in place from April 2016. Neil Loudon noted the qualification that this applied only to projects with costs greater than £250,000.

Stephen Pottle suggested that relatively few public bodies would be able to meet this date but pointed out that there were also exemptions, such as road resurfacing projects. He hoped to be able to link TfL's work with the current UKBB project and would include training both for TfL staff and the supply chain. He also noted that BIM should be embedded in a project from the outset rather than as an after-thought. He felt that the process had been well set out but the perception that it was just 3-D modelling had to be addressed.

Graham Cole reported that ADEPT members would generally follow the Government's requirement. Keith Harwood noted that Hertfordshire CC would be applying BIM on some major schemes but this would depend on consultant capability. Stephen Pottle concurred with this point; a recent exercise had showed that many consultants had yet to acquire BIM capacity.

Tomas Garcia recalled issues from the Olympics BIM work: the BIM model was often not current due to a lag in updates being loaded.

Neil Loudon reported that Highways England would be applying BIM on major projects including links to tagging and the supply chain.

Rob Dean noted that Network Rail were interested in post construction data ownership issues. Stephen Pottle reported that this issue would be part of the TfL work.

Action 22, Bridge Inspector Competency:

The action for Rob Dean to report on Network Rail's approach to inspections of large numbers of masonry arches was not taken.

Action 23, Bridge Inspector Certification Scheme (BICS):

Stephen Pottle reported on recent developments with the scheme including the LANTRA role and the appointment of Assessors. He pointed out that details of the scheme could be found on the LANTRA website. Stephen also noted that BICS would also feature in the new Code of Practice which would state that it would be highly desirable to adopt a competency scheme although it would not be mandatory. He noted, however, that organisations opting not to follow the scheme should have that decision endorsed by senior management or even politicians. Any consequential litigation would seek to establish the decision making process. Finally, Stephen pointed out that the BOF website still referred to the research project which should be amended.

ACTION 19: Paul Fidler

The Chairman asked for comments from the meeting:

- Neil Loudon explained that Highways England were soon to publish an implementation document and expected the scheme to be fully established within the next 18 months.
- Nick Burgess repeated his earlier points that LUL's scheme was closely aligned and considered that this was in the spirit of the new Code which was to adopt a scheme.
- David List noted that most large bridges had specifically trained inspectors which were very specific to their own structures.
- John McRobert reported that he was faced with zero maintenance budgets and felt that he could not afford to embrace the scheme. He also questioned the need for all inspectors having to be qualified and suggested that one or two senior qualified inspectors might be sufficient. John also noted that he had written a paper on how to save money on bridge inspections which he offered to share.
- Jacqueline Mynot noted that links within the LANTRA website did not seem to be working.
- Graham Cole reported discussions at the last ADEPT Bridge Committee which generally supported the views as expressed by John McRobert above.

- Rob Dean reported that all Network Rail inspections were now risk based with inspection frequencies adjusted to suit. Others agreed that the majority of costs were in Principal Inspections and reducing frequency from six to twelve years could result in substantial savings.

The Chairman widened the discussion into the life of various bridge elements, especially joints and bearings.

Neil Loudon suggested that there were too many variables to generalise; issues of installation, usage, prevailing conditions as well as problems of missing or weak as-built information meant that it was impossible to determine average lives.

Tomas Garcia reported that HS2 were trying to develop whole life costing models but had problems in determining realistic element design life. He had concluded that paying higher initial costs was economic and allowed for future proofing.

Stephen Pottle suggested that bridge owners should push the boundaries as far as element life is concerned and not just accept historic figures. In this way, suppliers would respond and design life would improve. He also mooted the idea that owners sharing experiences of cost and element life would be beneficial. On the question of expansion joint inspections, Stephen offered to locate and share a TfL guidance document.

ACTION 20: Stephen Pottle

John McRobert believed that research into actual deck thermal movements could result in savings when joints had to be replaced. Sakthy Selvakumaran noted that she was aware that this was under consideration.

Returning to the Bridge Inspector Certification Scheme, the Chairman welcomed the progress that had been made and especially remarked on the fact that the BOF logo featured prominently on the documentation.

Action 24, Network Rail/ADEPT national agreement:

Rob noted that he would be presenting on BAPAs and possession planning at UKBB in February and possibly at a future ADEPT Bridges Committee.

ACTION 21: Rob Dean

Action 30, ESDAL

Neil Loudon gave a presentation on ESDAL² which had been launched in January 2015. The new system still rested responsibility for notification on hauliers but its success was dependent on input from SOAs (Structure Owning Authorities). The Highways England lead on ESDAL² was Sam Twynning and any questions could be sent via abnormal.loads@highwaysengland.co.uk . Neil agreed that his presentation could be placed on the members' area of the BOF website.

ACTION 22: Paul Fidler

Rod Howe noted that many hauliers still do not comply with ESDAL with many movement notifications still being issued by fax. Rob Dean noted that the AIL liaison group was still active and agreed to give a presentation at BOF 49.

ACTION 23: Rob Dean

The Chairman referred to the Australian system which seemed to work well and included a database of which roads can take higher vehicles.

Action 34, LIDAR

Rob still has to check confidentiality issues before his presentation can be uploaded to the BOF website.

ACTION 24: Rob Dean/Paul Fidler

Action 35, 2016 BOF Research Programme

Research project suggestions would be incorporated into the new Grand Challenges document but suggestions should be sent ahead of BOF 49.

ACTION 25: All

Action 37, Review of Bridge Inspections

Neil Loudon reported on this issue, part of Highways England's Structures Improvement Plan, which had included annual audits of inspections. Among the total of 700 audited reports, there were serious issues of inconsistency. This had partly led to the development of BICS. Neil agreed to report in more detail at BOF 49.

ACTION 26: Neil Loudon

Action 39, Non-structural fixings

Nick Burgess reported briefly on the LUL work on fixings which was mainly concerned with fixings in buildings and other premises.

All unrecorded actions from BOF 47 had either been completed or were discussed as part of the BOF 48 agenda.

4. Membership Update

There were no BOF membership changes but the Chairman paid tribute, and gave a presentation, to Rod Howe who was about to retire. Rod recalled how he had been one of the attendees at BOF 1 and said how very much he had enjoyed attending BOF meetings. He advised that Andy Featherby would be the BOF C&RT representative from now on.

5. Feedback from UK Bridges Board and UKRLG

Richard Fish reported that there had been no meeting of the UKBB since BOF 47. Neil Loudon noted that there was still work to be done to convince all UKBB members to commit to BICS. He also suggested that there should soon be a call for further research topics via UKRLG.

6. High Speed 2 - Update

Tomas Garcia explained the latest developments with the HS2 programme which followed five stages of design:

- a) Parliamentary process via a Hybrid Bill;
- b) Outline specification;
- c) Employers' Requirement;
- d) ECI – an ITT is expected soon with a view to awarding an NEC ECI contract in Spring 2017;
- e) Design and Build.

Tomas went on to explain that a Whole Life Costing model was to be produced to compare proposals. Design requirements had already been produced, including aesthetic considerations with input from Atkins/Nicholas Grimshaw. A 47 strong Design Panel, chaired by Sadie Morgan would vet and challenge submissions.

Particular focus was being given to parapets on overbridges, bearing in mind that the line would carry 18 trains per hour travelling at 360kph, and HS2 were working with Network Rail and Highways England on this and other interface issues. Another study was looking at the set back of piers (up to eight metres) with respect to impact requirements. John McRobert asked whether a review of other national high speed lines, such as in Japan and France, had assisted in this deliberation; Tomas replied that both had piers set back further but noted that train speeds were also higher. HS2 were attempting to balance risk versus total cost.

Tomas also referred to the issue of noise mitigation which would be through high environmental barriers, probably greater than overbridge headroom clearance.

The Chairman asked whether any other lessons had been learnt from other international high speed lines. Tomas replied that there had only been high level contact and acknowledged that there might be benefit from discussions at a working level.

Tomas also raised the issue of a wide disparity in unit cost data for bridges between different consultants. Rob Dean offered to provide Tomas with a contact from Network Rail's finance team who might be able to assist. The discussion

then extended into the need for a database of unit costs. Neil Loudon noted that Highways England had already done this but agreed that it was difficult to establish why there were such differences. Rob Dean agreed to consider whether Network Rail records could be released to BOF members.

ACTION 28: Rob Dean

7. Flood Damage to Bridges – Temporary Bridges/Scour

The Chairman gave a brief résumé of recent flood events and understood that a total of 48 bridges had either collapsed or had been seriously damaged across the UK. As this was mostly through scour action it once again raised the issues of scour prediction, detection and protection. Neil Loudon noted that the Transport Select Committee report into the impact of the 2009 Cumbria floods, which had never been published due to the change of government following the 2010 general election, would have been a very useful benchmark to see if any lessons could be learnt.

Jacqueline Mynot referred to the need not to just look at the bridge site but to understand the management of the upstream watercourse, including the wider catchment and the change in hydraulic characteristics of a river when in flood. Neil Loudon agreed, adding that trapped debris causing changes to hydraulic loading and uplift flotation forces also needed to be taken into account. He also pointed out that CIRIA were about to start a project on learning lessons from flooding. The CIRIA contact was Owen Jenkins and the Chairman agreed to contact him regarding BOF's interest in the topic.

ACTION 29: Chairman

Richard Fish pointed out that the Exeter University EPSRC project on the effects of debris impact and accumulation was currently in progress.

Rob Dean gave a presentation on the scour damage and subsequent protection works at Lamington Viaduct on the West Coast Main Line near Lanark. Network Rail also had at least one other failure in Scotland where scour protection, installed in 2011/12 had been washed away. Tomas Garcia noted that Spanish Codes specified rip-rap weights to suit projected flows in flood conditions.

Rod Howe referred to C&RT's Elland Bridge which had also been damaged and pointed out the problems that had arisen for utility companies. Any forward planning strategy should also engage statutory undertakers.

Keith Harwood questioned the differences between scour/flood risk assessment processes adopted by Highways England and Network Rail. Neil Loudon reported that HE had just updated BD 97.

Rob Dean noted that Japan Rail East have a London office to gain knowledge of UK practice and to benchmark their specifications etc. He suggested that they might be consulted on scour protection as well as other topics. The Chairman agreed to contact them with regard to both a presentation at a future meeting and to possibly invite them to join BOF.

ACTION 30: Chairman

8. Forth Road Bridge – Recent Closure

Richard Fish declared an interest in this subject as he had been asked to give evidence at the Scottish Parliament inquiry in February and took no part in discussions.

With Wayne Hindshaw's absence, there was no authoritative knowledge on the exact circumstances of the closure and debate centred around inspection strategies, the use of BD 79, structural health monitoring and the level of reserves held by bridge owners for emergency works.

9. BOF Initiated Research Projects - Update

9a. Bridge Inspector Certification Scheme

The Chairman noted that this had been fully covered under Item 3 and it was agreed that future reporting and discussions at BOF would be limited to the level of uptake amongst bridge owners.

9b. Hidden Defects in Critical Bridge Components

Richard Fish declared an interest in this research as he was part of the review team for Arup/Aecom who were undertaking the project. Neil Loudon reported that he reviewed the latest draft and there was still much work to be done.

9c. Safety Critical Fixings

Neil Loudon tabled a recent email, from the WSP|Parsons Brinckerhoff team who were carrying out the project, and a draft report contents page. Neil's immediate reaction was that the present emphasis seemed to be on design and less on maintenance and management. An industry workshop was scheduled for 22nd March. Neil also drew attention to the CIRIA work on fixings and the LUL work mentioned under item 3 above.

9d. Deterioration Modelling

Keith Harwood gave a progress report. He had circulated a draft scope and received only a few responses, including especially one from TfL, but welcomed input from Network Rail and HS2. Keith's main concern centred on project procurement as he had had no response from DfT, nor any word on their funding

contribution. Neil Loudon pointed out that a new SPATS framework should be let from mid-February which was open to use by DfT, HE and Local Authorities. Keith will consider procurement options, including either Hertfordshire CC or TfL taking a lead.

ACTION 31: Keith Harwood

10. Other Bridge Research Update

As most research issues had already been covered, this item was not taken in detail. Rob Dean, however, noted that Network Rail had cancelled any seed corn funding for research until further notice. John McRobert noted that Ulster University, Belfast, had an ongoing research project on forced scour.

11. New Bridges and Major Projects Update

Neil Loudon referred to the proposed major tunnels on the A303 at Stonehenge and the Trans Pennine Tunnel as mentioned in the new National Infrastructure Plan. Jacqueline Mynot noted that the Welsh Government were working on Heads of the Valleys schemes as well as the M4 diversion at Newport. Jason Hibbert had had to leave the meeting by the time this item was taken but it was agreed that the latter might be worthy of a presentation at BOF 49.

ACTION 32: Chairman/Jason Hibbert

12. Any Other Business.

12a. CSIC and UKRIC: Stephen Pottle suggested that presentations on this work would be valuable at BOF 49.

ACTION 33: Chairman

12b. CUED Report on Structural Health Monitoring: The Chairman agreed to circulate this report for comment.

ACTION 34: Chairman

12c. Southampton University Scour Detection Project: Rob Dean reported that this work, using sonar, had yielded some interesting results. Nick Burgess also noted that the Port of London Authority had a similar system for mapping the bed of the River Thames. The Chairman agreed to consider these as possible presentations at a future BOF meeting.

ACTION 35: Chairman

12d. Vehicle Incursion

It was noted that there was renewed interest in vehicle incursion following the Froxfield incident. It was agreed that this should be raised at UKBB, especially with regard to DfT input.

ACTION 36: Richard Fish/Neil Loudon

13. Proposed Dates for Future BOF Meetings

BOF 49: 17th May 2016 and BOF 50 provisionally 1st November 2016.

14. Closing/Summing Up

The Chairman thanked everyone for their attendance and contribution to the meeting.

Richard Fish,
Technical Secretary

3rd March 2016