# ASX Limited

## Independent Expert Assessment of ASX's Actions to address the IBM Review Recommendations

13 May 2022

EY
**Building a better working world**

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# 1. Executive Summary

## Reporting summary for quarter

Our assessment found that ASX has continued to make progress towards addressing and implementing the IBM Review Recommendations this quarter, however, it is recognised by ASX that the more substantial and complex items to address are still to come and that it is currently unlikely that the 80% target will be met by the June 2022 reporting date.

In addition, "carryover" ASX Actions (items determined incomplete) from prior quarterly reviews that require finalisation will need to be managed by the Delivery Excellence Program ("the Program") in the coming quarters.

The Program continues to be well run, has the appropriate governance and oversight, and is staffed and supported by individuals well suited to deliver a quality outcome against the ASX Actions. We note that Covid exposure is still a potential issue and recognise that the management team is tracking this exposure, yet has limited options to address it practically. Furthermore, ASX has demonstrated that they have taken feedback from our first quarterly IE review and report, and incorporated learnings into this review period.

ASX submitted nine (9) Recommendations for closure in their March 2022 quarterly report and we observed that they did not achieve their desired submission target of ten (10) Recommendations.

We have reviewed the nine (9) Recommendations and found that that six (6) of those Recommendations have been fully addressed, with three (3) Recommendations partially addressed and requiring follow up evaluation in subsequent review periods. Specifically, of the twenty-three (23) ASX Actions related to the nine (9) Recommendations, twenty (20) have been fully completed.

We will continue to evaluate and offer commentary on the processes, governance, and resources as we evaluate the closure of ASX Actions addressed by the Program in the future.

## Background

In November 2020 an outage occurred following a major upgrade to ASX Operations Pty Ltd equity trading platform (ASX Trade), called the ASX Trade Refresh project. Consequently, the Australian Securities and Investments Commission (ASIC) and the Reserve Bank of Australia (RBA) required an Independent Expert review of the ASX Trade Refresh project to be completed. ASX appointed IBM Australia Limited (IBM) to undertake this review. IBM made 59 recommendations ("Recommendations" or "IBM Review Recommendations") in total across the following seven key domains in the review: risk, governance, delivery, requirements, vendor management, testing and incident management.

ASX subsequently developed a management response plan ("Response Plan" or "Plan") which consists of 182 deliverables ("ASX Action") to address the 59 IBM Recommendations.

In November 2021, the Minister imposed certain Licence Conditions on ASX. The Australian Market Licence (ASX Limited) Additional Conditions Notice 2021 (No. 1) dated 24 November 2021 requires ASX to:

- Address each of the IBM Review Recommendations to the satisfaction of ASIC, and

- Appoint an Independent Expert ("IE") to conduct an assessment of its implementation of the ASX Actions to address the IBM Review Recommendations.

## Scope

In accordance with the relevant Licence Conditions, ASX, with ASIC's and RBA's consent, engaged Ernst & Young ("EY") to review each of the Quarterly Reports produced by ASX and assess whether the actions undertaken in the period covered by the report demonstrate appropriate implementation of, and progress towards addressing the IBM Review Recommendations. Refer to section 2.2 for detailed scope related to this report.

## Approach

Our approach is to assess the quarterly reports produced by ASX. This includes an assessment of the closure packs and supporting evidence for the ASX Actions reported as closed during the period. As part of our assessment, we will consider:

- Whether the ASX Actions comprehensively address the relevant IBM Review Recommendations

- Whether the ASX Action is implemented in a sustainable manner

- The skills and experience of the people engaged by ASX to implement the ASX actions

- The closure of ASX actions is supported by demonstrable evidence, and has been subject to appropriate internal due diligence and governance processes

- The consistency of the attestations reported in ASX's quarterly report with our understanding of the status of the ASX actions.

Refer to section 2.3 for detailed approach related to this report.

## Historic findings and recommendations

This is our second Independent Expert quarterly review report under the Licence Condition.

In the first IE quarterly review report (ASX Independent Assessment of IBM Recommendations Review) submitted on 28 February 2022, we found that out of the twenty-two (22) recommendations submitted for closure, twenty-one (21) Recommendations have executed fully and appropriately with four (4) Recommendations requiring follow-up to evaluate the ongoing sustainability of the ASX Actions. We are tracking the progress of those Recommendations in this report (section 3.1), due for update in the June 2022 quarterly review period.

In our Design Adequacy Report (ASX_Independent Expert Design Adequacy Assessment of the ASX Response Plan_27042022_Final Report) submitted on 27 April 2022, we found that of the remaining 37 Recommendations that were due for submission in future quarterly

reviews, there were thirteen (13) partially addressed Recommendations. Four (4) of those partially addressed Recommendations have been submitted as part of this second quarterly review period.

For detailed progress of the 59 IBM Recommendations please refer to Appendix E.

## 2. Introduction

### 2.1 Background

**Recommendations Review**

To address the 59 IBM Recommendations, ASX subsequently developed a management response plan which consists of 182 deliverables. The Plan is structured around the following seven elements (which are different to the seven domains from the IBM review) that seek to improve ASX's project execution capability and to reduce the likelihood of similar project execution incidents in the future:

- Ensuring diverse thinking, avoidance of group think and challenge
- Increasing resources
- Upgrading policies, standards, and frameworks
- Educating staff so that they clearly understand the standards and practices expected of them
- Monitoring individual projects and the portfolio for compliance with ASX's policies, standards and
- frameworks
- Improving ASX's testing capability and capacity
- Improving ASX's project reporting and quality.

In November 2021, the Minister imposed certain Licence Conditions on ASX. The Australian Market Licence (ASX Limited) Additional Conditions Notice 2021 (No. 1) dated 24 November 2021 requires ASX to:

- Address each of the recommendations to the satisfaction of ASIC, and
- Appoint an Independent Expert (IE) to conduct an assessment of its implementation of the ASX actions to address the IBM review recommendations.

ASX has obtained the consent of ASIC to appoint Ernst & Young (EY) as the IE to conduct this assessment.

### 2.2 Scope

EY has been engaged to deliver the following scope of work:

In accordance with Licence Condition 4, ASX must by 31 January 2022 and thereafter within 14 days of each quarter end date occurring during the period from 31 March 2022 to 30 June 2023, give a report to ASIC and the IE containing an update on:

- The progress of the implementation of the ASX actions to address the review recommendations, and
- If there are any issues in implementing any remediation actions, the reasons for those issues and what ASX Action ASX will take to address them.

The quarterly report must be accompanied by an attestation from the relevant oversight body from ASX.

The scope of our engagement as the IE in accordance with the relevant licence condition is to:

- Review and assess each of the quarterly reports produced by ASX (as required under Licence Condition 3) and
- Within 30 days of receipt of each quarterly report, provide ASX and ASIC with a written report setting out whether the ASX Actions undertaken in the period covered by the report demonstrate appropriate implementation of, and progress towards addressing, the IBM review recommendations.

### 2.3 Approach

When conducting our assessment for the delivery of this report, the following activities were performed:

1. *Documentation review:* A detailed review and analysis of ASX's actions and provided artefacts, including closure packs, written responses, and additional supporting evidence. All documentation

was provided to EY by ASX based on a documentation request. A list of documentation reviewed can be found in Appendix D.

2. *Questionnaire submission to ASX:* Following review of the documentation, the EY team submitted a set of questions (if any) related to the recommendations and subsequent ASX actions 36-48 hours prior to the meeting where ASX prepared responses for the joint recommendation review workshops. A list of questionnaires submitted to ASX can be found in Appendix C.

3. *Recommendation review workshops: W*orkshops were held to review and discuss the recommendations between key ASX stakeholders and EY SMRs (Subject Matter Resources) to go through the pre-submitted questions related to ASX's remedial actions approach. A list of all workshops conducted with ASX can be found in Appendix A and a list of interviewed ASX stakeholders can be found in Appendix B.

Following our review of the documentation, supporting evidence and knowledge gathered from recommendation review workshops with the relevant ASX stakeholders, the EY team have determined whether the ASX Actions are appropriate to close the IBM Recommendations by adopting the following approach for each of the ASX Actions:

1. **Has the recommendation been fully addressed by the ASX Action(s)?**

   **Yes ✔ / No ✖ / Partially done ✔**

2. **Were ASX Action(s) in response to the IBM Recommendation reasonable and appropriate?**

   **Yes ✔ / No ✖ / Partially done ✔**

3. **Is the ASX Action(s) sustainable? Has the ASX response to the recommendation considered measures to enforce / ensure that the ASX Actions remain closed in the future?**

   **Yes ✔ / No ✖ / Partially done ✔**

The assessment criteria described above determines if the recommendation was fully, partially, or not appropriately addressed.

For detailed and comprehensive commentary around our decision, please refer to each recommendation's 'Findings' section.

## 2.4    Limitations

We draw your attention to the limitations inherent in this report:

- Our work was not performed in accordance with generally accepted auditing, review, or other assurance standards in Australia and accordingly does not express any form of assurance. This report does not constitute legal opinion or advice. We have not conducted a review to detect fraud or illegal acts.

- Our work does not assume any responsibility for any third-party products, programs or services, their performance or compliance with your specifications or otherwise.

- Our work did not intend to identify, address, or correct any errors or defects in your computer systems, other devices, or components thereof ("Systems"), whether or not due to imprecise or ambiguous entry, storage, interpretation, or processing or reporting of data. We are not be responsible for any defect or problem arising out of or related to data processing in any Systems.

- Our Recommendations review was limited to the information available and provided by ASX at this stage, where for future reviews included in the plan only high-level planning has been conducted and a detailed analysis of scope and effort is pending.

- Our review was limited to documents provided by ASX as deemed relevant in line with the agreed scope and EY requests, with the expectation that ASX had those artefacts documented to satisfy its own reporting needs.

- Any projection of the outcome related to the recommendation's response and its sustainability for future periods, is subject to the risk that the actions may become inadequate due to changes

in conditions, or that the degree of compliance around remedial actions taken may deteriorate over time.

- Our scope under the licence conditions requires us to oversee the ASX Actions taken related to ASX's Plan and our Independent Expert review which are relevant to the recommendations and its remedial actions. For the purpose of our engagement, we define oversee as to observe and inspect ASX has acted accordingly. ASX is accountable and responsible for the implementation activities and EY will not act as management or direct the implementation.

## 2.5 Use and disclosure of our reports

We are providing specific advice only for this engagement and for no other purpose and we disclaim any responsibility for the use of our advice for a different purpose or in a different context. If you plan to use this advice on another transaction or in another context, please let us know and provide us with all material information that we can provide advice tailored to the appropriate circumstances.

Our Reports (including the EY Summary Reports) may be relied upon by ASX and ASX's regulators, ASIC and the RBA, for the purpose outlined in this SOW only. We understand that ASIC and the RBA may issue a media release and/or a public report referring to or publishing the content of our Reports and may publish our Reports and/or the EY Summary Reports or make or issue its own summary from the content of our Reports.

For the avoidance of doubt, no other party other than ASX, ASIC and the RBA may rely on the Reports. We disclaim all responsibility to any such other party for any loss or liability that the other party may suffer or incur arising from or relating to or in any way connected with the contents of our Reports, the provision of our Reports to the other party or the reliance upon our report by the other party.

# 3. Monitoring of Partially Addressed Recommendations and ASX Actions

## 3.1 Previous quarterly review periods

The objective of this section is to monitor the status of IBM Recommendations that were submitted in previous quarterly review periods and deemed "partially addressed" or "not addressed", and determine if it is fully executed, appropriate or sustainable following a re-submission by ASX and re-evaluation by the IE.

In the first quarterly report submitted by ASX on 28 January 2022, we identified the below Recommendations as needing further evidence in future quarters for re-evaluation:

- 1.2.1 - Ensure Line 2 resource expertise: Sustainability of Actions 1 and 2
- 5.1.1 - Perform contract acceptance at end of project lifecycle: Sustainability of Action 1
- 5.1.2 - Create guidelines for supplier contract acceptance testing: Full execution of Action 1
- 6.6.1 - Ensure ASX Trade included in next annual ITDR exercise: Sustainability of Action 1

ASX has stated in their March 2022 report that the above Recommendations will be re-submitted during the June 2022 quarterly reporting period for evaluation.

For an overview of the status of each of the 59 Recommendations, please refer to Appendix E.

## 3.2 Design Adequacy Report

The objective of this section is to monitor the status of the recommendations we made as the IE in our Design Adequacy Report, and determine if they have been addressed by ASX.

In our Design Adequacy Report, we provided four (4) recommendations ("IE Recommendations"), with two (2) relating to the overall 'Program governance and management' by ASX of its Delivery Excellence Program, one (1) relating to the 'Timing of ASX Actions' and one (1) relating to 'Adequacy of ASX Actions':

| # | IE Recommendation | Status | Date Due |
|---|---|---|---|
| 1 | **Program governance and management** Articulate Change Management strategy for assessing each Recommendation from an organisational change management perspective including people impact assessments, organisational change impacts, and training on implemented ASX Actions (including resourcing traceability to best ensure training completion is achieved) and communications approach | In Progress | 30 June 2022 (in readiness for next quarter) |
| 2 | **Program governance and management** Develop a detailed Program Charter to provide full visibility around the Program | In Progress | 31 May 2022 |
| 3 | **Timing of ASX Actions** If ASX does not meet their 80% of closure target by the June 2022 quarterly review, ASX should review carry out a workplan review for corrective action | In Progress | 31 July 2022 (if workplan review is required) |
| 4 | **Adequacy of ASX Actions** Take into consideration of IE findings and recommendations outlined in section 3 of the Design Adequacy Report for IBM Recommendations deemed 'partially addressed'. Consideration should be given to how ASX address these items in a more holistic manner than outlined currently to ensure closure in the relevant quarterly review period. | Ongoing | 30 June 2023 |

| | | |
|---|---|---|
| **Note**: This will form as part of the outcome of our IE quarterly review assessments, until the last report in August 2023. | | |

Please refer to the Design Adequacy Report to read our detailed findings and commentary.

Based on current progress, ASX are not on track to meet their 80% target in the June 2022 quarterly review period, and intend to re-plan their delivery timeline in the upcoming months. We will provide our assessment of the re-planned timeline as soon as reasonable.

# 4.    Our Findings

Detailed below are our Independent Expert findings following our assessment of the actions taken by ASX as part of their Response Plan to address the IBM recommendations, on whether ASX have taken the adequate steps to close the recommendations.

The following pages provide detailed findings for each of the nine (9) recommendations submitted by ASX to ASIC and RBA on 13 April 2022 as part of the second quarterly review period.

# Summary of Review Recommendations Assessment

Below is a summarised view of the outcome of each Recommendation and its related ASX Action(s) submitted this quarter. For detailed commentary around findings please refer to the following pages.

| # | Recommendation / ASX Actions | | Executed | Appropriate | Sustainable |
|---|---|---|---|---|---|
| 1.2.6 | **Review project priority categorization requirement** | | Recommendation has been partially addressed | | |
| | **Action 1** | Project Risk Specialist to be recruited (New Headcount) to refresh the Enterprise Project Risk Management Framework and associated templates, metrics and controls and manage the framework going forward | ✔ | ✔ | ✔ |
| | **Action 2** | Review criteria for assessing P1, 2, and 3 projects and management actions that follow | ✔ | ✔ | ✔ |
| | **Action 3** | Review criteria for assessing high, medium, low risk projects (PRA) and management actions that follow | ✔ | ✔ | ✔ |
| | **Action 4** | Present this to the PGG | ✘ | ✔ | ✔ |
| | **Action 5** | Update impacted policies after PGG endorsement | ✔* | ✔ | ✔* |
| 1.3.6 | **Identify project risks using techniques to get diverse views** | | Recommendation has been partially addressed | | |
| | **Action 1** | Project Risk Specialist to be recruited (New Hire) to define and manage the Enterprise Project Management Framework, templates, practices, controls and metrics | ✔ | ✔ | ✔ |
| | **Action 2** | 2. Update the following policies/documents to include this concept<br>a. Enterprise Risk Management Framework (ERMF)<br>b. Enterprise Project Risk Management Framework (EPRMf)<br>c. Project Risk & Issues Management framework (PRIMf)<br>d. Risk Champions guidance note | ✔ | ✔ | ✔ |
| | **Action 3** | Update the Expectations of Line 2 on PSGs document to include this concept | ✔ | ✔ | ✔ |
| | **Action 4** | Include as a topic of discussion in the Risk culture and awareness short and long-term education session in response to 1.1.1-2 | ✔ | ✔ | ✔ |
| 5.1.3 | **At next upgrade, evaluate need for clean contract baseline with Nasdaq** | | Recommendation has been addressed | | |
| | **Action 1** | ASX will clean Nasdaq contract at the next major upgrade. This will be noted and diarised by both Vendor Management and Contract Management | ✔ | ✔ | ✔ |

| # | | Recommendation / ASX Actions | Executed | Appropriate | Sustainable |
|---|---|---|---|---|---|
| 6.2.2 | | **Update central repository for testing documents** | Recommendation has been addressed | | |
| | Action 1 | Implement a central QE repository for all testing related policies, procedures, methods and tools to provide a uniformly accessible and integrated source for reference for the ASX testing methodology | ✔ | ✔ | ✔ |
| | Action 2 | Include demonstration and use of central repository into ASX QE vision, policy, processes and procedures awareness and embedding program | ✔ | ✔ | ✔ |
| | Action 3 | Ensure repository is appropriately visible to external parties | ✔ | ✔ | ✔ |
| 6.4.1 | | **Include solution maturity assessment in Design Authority checklist** | Recommendation has been addressed | | |
| | Action 1 | Enhance architecture process to embed formal indicators of quality risk to guide testing strategy and plan | ✔ | ✔ | ✔ |
| | Action 2 | Include "Solution Quality" as an evaluation criteria (including minimum thresholds) in the architecture evaluation process | ✔ | ✔ | ✔ |
| 6.4.4 | | **Evaluate need for full DR test before major system release** | Recommendation has been addressed | | |
| | Action 1 | Enhance QE policy, processes, procedures and acceptable testing standards for non-functional testing, addressing mandatory testing types such as full ITDR/BCP testing of major systems | ✔ | ✔ | ✔ |
| | Action 2 | Integrate mandatory non-functional testing types into delivery risk management processes | ✔ | ✔ | ✔ |
| 6.4.8 | | **Consider using independent expert to review test plan for high risk projects** | Recommendation has been partially addressed | | |
| | Action 1 | Establish model and panel for independent specialist review and advice regarding test strategy and plans and inclusion of specialist testing capabilities | ✔ | ✔ | ✔ |
| | Action 2 | Update estimation and delivery frameworks to include specialist review | ✔ | ✔ | ✔ |
| | Action 3 | Provide ongoing monitoring and reporting and feedback to ASX governance forums (TOSC/ARC), continuous improvement and QE governance | ✔ (amber) | ✔ | ✔ (amber) |
| 6.7.1 | | **Review policy on conformance testing** | Recommendation has been addressed | | |
| | Action 1 | A review of the nature and reason for any customer 'testing' on go-live weekends will be undertaken | ✔ | ✔ | ✔ |
| | Action 2 | Any findings from this will be updated in relevant testing and Project Governance policies | ✔ | ✔ | ✔ |

| # | Recommendation / ASX Actions | | Executed | Appropriate | Sustainable |
|---|---|---|---|---|---|
| 7.1.1 | Ahead of and during an outage, identify conditions under which certainty provided to customer by closing for entire day | | Recommendation has been addressed | | |
| | Action 1 | Establish a working group to consider options for managing the market in the event of an extended outage, and bring back a proposal on how to provide additional clarity to market users | ✔ | ✔ | ✔ |
| | | | | | |

\* Considered complete as not applicable for this specific action

# Recommendation 1.2.6: Review project priority categorization requirement

| | Executed | Appropriate | Sustainable |
|---|---|---|---|
| ASX Action 1 | ✔ | ✔ | ✔ |
| ASX Action 2 | ✔ | ✔ | ✔ |
| ASX Action 3 | ✔ | ✔ | ✔ |
| ASX Action 4 | ✘ | ✔ | ✔ |
| ASX Action 5 | ✔* | ✔ | ✔* |
| Recommendation Addressed? | Partially | | |
| Comment | This recommendation has been largely closed with the actions conducted to date.<br><br>While ASX has reviewed their criteria for assessing P1, P2 and P3 projects, and the criteria in the PRA for assessing high, medium and low risk projects, to support the implementation of the Recommendation, ASX has not executed Action 4 as at the time, they deemed the changes made not material enough to require PGG presentation and sign off, and the Line of Business executive had already reviewed and endorsed the changes. However, following a meeting on 12 May 2022, ASX has confirmed that as per their internal process, the changes are required to go to the PGG for endorsement and sign off as per their RACI matrix, and they will do so accordingly.<br><br>In terms of Action 5, ASX determined that policies were not required to be updated as they had already been updated from previous Recommendations being implemented, and the changes were not material enough to require further changes. As a result, we are marking the | | |

| execution of Action 4 as 'Not Executed' and the sustainability of Action 4 as 'Partially Addressed' until such time we can confirm that ASX has presented the changes to their PGG for endorsement and sign off.<br><br>EY will include the completion of this 'Partially Addressed' item in its scope for subsequent reviews. |
|---|

**\*** Considered complete as not applicable for this specific action

## Background/Tasks

Review the categorisation and differences in approach between the various project priority levels to ensure it is suitable against risk appetite and control needs.

## ASX Action(s)

1. Project Risk Specialist to be recruited (New Headcount) to refresh the Enterprise Project Risk Management Framework and associated templates, metrics and controls and manage the framework going forward
2. Review criteria for assessing P1, 2, and 3 projects and management actions that follow
3. Review criteria for assessing high, medium, low risk projects (PRA) and management actions that follow
4. Present this to the PGG
5. Update impacted policies after PGG endorsement

## Findings

### ASX Action 1:

ASX has recruited a new Senior Project Risk Specialist for their Enterprise Risk Management space, who started on 1 February 2022.

During the recruitment process, ASX included as part of the 'Position Description' that the "position will be directly responsible for the

Enterprise Project Management Risk Framework and associated policies, processes, tools, templates and performance metrics / reporting of project delivery risk at an enterprise level."

As part of their 'Summary Consolidation Page' provided in the closure pack for Recommendation 1.2.6, ASX has acknowledged that the Senior Project Risk Specialist will also lead and contribute to the analysis, design and build for future IBM recommendations and actions focused on refreshing project risk management: Recommendations 1.2.2, 1.2.3, 1.3.5 and 1.3.7.

**ASX Action 2:**

ASX has conducted an 'ASX Project Criteria Review' (current state assessment) in March 2022 to determine if a change was required to the P1, 2 and 3 criteria below, and management actions. The criteria definitions are:

- Priority 1: Primary driver - long-term sustainable value, ASX Contractual commitment or regulatory imposed deadline / obligation
- Priority 2: Direct pre-requisite relationship to Priority 1
- Priority 3: Delivers incremental revenue or operational efficiency / stay in business objectives to ASX and Customers

ASX noted that P1, 2 and 3 was originally established to inform project priority, however its current focus is determining management actions. Some leadership & project team members interpreted the rating as an informal 'priority within a priority'. Alternatively, a process introduced by Internal Investments to aid in decision making at group level (ExCo) could be leveraged to formally designate priority.

Following their internal review, ASX had the following conclusions and recommendations to improve consistency in applying appropriate controls and management actions to projects:

- Conclusion 1: Wide variation of classification possible based on interpretation of P1,2,3 definitions leading to inconsistent application of controls & management actions on projects

  - Recommendation: Replace P1,2,3 with assessment based determination of project categories, e.g., Tier1,2,3 that does not indicate priority
- Conclusion 2: P1,2,3 used for two sometimes contrasting purposes: project importance and project governance (e.g., project can be simple yet important)
  - Recommendation: Replace P1,2,3 with specific terminology that defines project categorisation, formally excluding notion of 'Priority' from assignment of required controls & management actions
- Conclusion 3: Non-projects (i.e., Service Releases) are assigned P1 to highlight regulatory related small change to leadership
  - Recommendation: Exclude non-projects from project categorisation, and if required, define alternate reporting / governance approach for Regulatory commitments / obligations that are non-project

**ASX Action 3:**

The Project Risk Assessment (PRA) is used at ASX to determine if a project is high risk, medium risk or low risk. As part of their review process, ASX reviewed all elements of their PRA against the ASX Risk Appetite Statement (RAS), and made changes to align the PRA and RAS, in terms of domain and language consistency. ASX provided evidence of all the changes made in a document, which contained a table identifying all the changes from the most recent version of the PRA template incorporated into the new version of the PRA released in March 2022. The changes were:

- Changing 'Risk Dimension' heading from 'Project' to 'Operational'
- Changing 'Risk Category' from 'Experience & Resources' to 'People'
- Changing 'Criteria' heading from 'Project Team Size' to 'Resource Effort/Capability (Demand/Supply)'
- 'Risk Scoring Guidance' updated for 'Resource Effort/Capability (Demand/Supply)'
- Realigning 'Risk Category' from 'Testing' to 'Technology' 'Risk Dimension'

ASX noted the subject of greatest change was the criteria related to 'Project Team Size' being assessed as 'Resource Effort/Capability (Demand/Supply)', with the latter criteria replacing the former and extending to new Risk Scoring Guidance.

ASX stated in their written response on 27 April 2022 that the changes made did not affect the manner in which the PRA process is executed nor the mechanics of using the template.

**ASX Action 4:**

ASX stated that as part of Action 2, they produced the 'ASX Project Criteria Review' paper that drew conclusions and provided recommendations on how ASX could start applying consistent controls and management actions to projects that are standard driven when considering project categorisation. The paper was reviewed and endorsed by the Customer Line of Business Executive, the Delivery Centre of Excellence General Manager and EPMO Senior Manager and deemed fit for purpose as a recommendation to proceed to further solution design and build. This artefact would inform the next stages of design and building a scaled framework that uses the standard of project categorisation, relating to Recommendations 1.3.4 and 3.2.1 which will be presented in future quarterly reviews.

Due to the sequencing of deliverables, ASX determined that the changes resulting from Action 2 and 3 were not required to be reviewed by the PGG at this time, and do not have impact on policies. ASX stated that once further analysis is performed after the related recommendations are submitted for closure, the presentation to PGG and the identification of impacted policies will be performed.

**ASX Action 5:**

As stated in Action 4, ASX determined that the changes resulting from Action 2 and 3 were not required to be reviewed by the PGG at this time, and do not have impact on ASX policies. ASX intends to perform further analysis after the related recommendations (1.3.4 and 3.2.1) are submitted for closure, and then the presentation to PGG and the identification of impacted policies will be performed.

ASX stated they concluded that there was no requirement to take changes made in Action 3 to the Project Risk Assessment (PRA) to PGG, as the changes were not materially significant to warrant PGG visibility, review and signoff. The changes made were to align the PRA to the ASX Risk Appetite Statement, and resulted in no change to the manner in which Project Risk Management is treated and executed.

**ASX Action(s) update Communication Log:**

| Channel | Description | Date |
|---|---|---|
| ASX Delivery Framework Blog Post on Confluence | Communication to raise awareness of change and effective use (PRA template updates) | 25/03/2022 |
| Outlook Email | Communication to raise awareness of change and effective use (March ASX Delivery Framework changes) | 28/03/2022 |

# Recommendation 1.3.6: Identify project risks using techniques to get diverse views

| | Executed | Appropriate | Sustainable |
|---|---|---|---|
| ASX Action 1 | ✔ | ✔ | ✔ |
| ASX Action 2 | ✔ | ✔ | ✔ |
| ASX Action 3 | ✔ | ✔ | ✔ |
| ASX Action 4 | ✔ | ✔ | ✔ |
| Recommendation Addressed? | Partially | | |
| Comment | This recommendation has been largely closed with the actions conducted to date. While ASX has stated they will be including this topic for discussion in the Risk Culture and Awareness short and long-term education sessions under Recommendation 1.1.1-2 (due in June 2022), this training has not been completed. As a result, we are marking the execution and sustainability of ASX Action 4 as 'Partially Addressed' until such time we can confirm that ASX has completed the long-term training sessions due in June 2022. EY will include the completion of this 'Partially Addressed' item in its scope for subsequent reviews. | | |

## Background/Tasks

Project risks should periodically be identified using a Delphi-style technique to reduce risk of group think and normalcy biases. Other risk identification techniques described in ISO 31010 should also be considered at key project milestones. Risk identification should also be tagged against standard categories, to enable reporting of categorisation coverage to control functions.

## ASX Action(s)

1. Project Risk Specialist to be recruited (New Hire) to define and manage the Enterprise Project Management Framework, templates, practices, controls and metrics
2. Update the following policies/documents to include this concept:
   - Enterprise Risk Management Framework (ERMF)
   - Enterprise Project Risk Management Framework (EPRMf)
   - Project Risk & Issues Management framework (PRIMf)
   - Risk Champions guidance note
3. Update the Expectations of Line 2 on PSGs document to include this concept
4. Include as a topic of discussion in the Risk culture and awareness short and long term education session in response 1.1.1-2

## Findings

### ASX Action 1:

As stated in the Findings for Recommendation 1.2.6, ASX Action 1, ASX has recruited a new Senior Project Risk Specialist for their Enterprise Risk Management space, who started on 1 February 2022.

See 'Findings' section for Recommendation 1.2.6, ASX Action 1, for additional details.

### ASX Action 2:

Following the recommendation, ASX has updated relevant policies and documents to include the concept of the Delphi technique when uncertainty exists and expert and diverse judgement is needed, and to raise awareness of other risk identification techniques that can be used to assist in reducing bias and group think. Updates were made to the following artefacts:

- **Enterprise Risk Management Framework (ERMF)**
  - Section 3.2 'Principles', bullet point three

- Under section 3.3 'Three Lines of Defence', in table row titled 'Line 2 CRO Risk and Compliance Team', bullet point two
- Section 5.6 'Project Risk Management', in table row titled 'Development plan to PGG, initial funding stage', and column 1 footnote 15 (describes periodic review of PRA)
- Section 5.6 'Project Risk Management', first paragraph after table; identifies sources for risk raising (additional to PRA and Process Risk Assessment exercises)
- Section 6.1 'Risk Context', topic titled 'Risk & Compliance Culture', bullet points two and three
- Section 6.2 'Risk Identification and Assessment', topic titles 'Risk Identification', after the table bullet point three identifies techniques project must use, which includes the Delphi technique. The footnote points out other techniques from ISO standard 31010 can be used
- Under 'Appendix I – Key Risk Categories', under 'Operational' risk category, bullet point eight

- **Project Risk Management Framework (formerly the EPRMf)**
  - Section 1 'Project Risk Assessment', final paragraph with title 'How to identify risk'
  - Section 3 'Implementation Readiness', final paragraph with title 'How to identify risk'
  - Both sections 1 and 3 link to further guidance

- **Project Risk & Issues Management framework (PRIMf) under Delivery Risk Management Framework**
  - Expandable section titled 'Risk and Issue Management – Workflow', under 'Process Step', step 2 'Identify Risk / Issues and Evaluate', final paragraph with title 'How to identify risk'

- **Risk Champions guidance note**
  - A guide created to assist Risk Champions to execute effective risk management
  - Section titled 'What is a Risk Champion', area titled 'Risk Champions', bullet point two and dash point four
  - Topic at end of the guide titled 'Speaking up'
  - A 'Guidance on risk identification techniques (aligned with ISD31010' was also distributed to Risk Champions

In their written response provided on 27 April 2022, ASX explained that the Delphi technique is mandatory for the Project Risk Assessment and the Implementation Readiness go/no-go decision for go-live. ASX has created a section under 'Project Risk Management' on their Confluence site to provide projects with guidance on how to use the Delphi technique.

ASX also stated that at the commencement of a 'Define & Plan' phase a mandatory BTOPPC (Business Vision and Strategy, Technology & Services, Organisation & Roles, Process and Procedures, People and Culture, Customer Experience) assessment is performed and this helps identify stakeholders to be engaged to contribute to a project – the panel identified for the Delphi technique adoption can be a construct of people from many ASX Line of Businesses.

**ASX Action 3:**

ASX has updated the 'Guidance for Line 2 on Project Risk Governance' document under section 1 'Project Risk Assessment', under title 'Risk/issue identification, assessment and management', bullet point five, and section 2, under title 'Risk/issue identification, assessment and management', bullet point two, for the comment *'Have resources with relevant subject matter expertise been involved in assessment of process impacts, and any existing/new controls identification and assessment forums been appropriate to reach consensus (e.g. 'Delphi' technique to help reduce bias and group think)'* to be included.

**ASX Action 4:**

ASX delivered 3 training sessions in December 2021 to highlight and uplift the visibility and awareness of risk management and its relationship to governance. One session was delivered to ASX board members and the other 2 sessions were delivered to ASX Project Sponsors, Owners and PM's involved in P1 and High-Risk Projects, plus any other identified stakeholders.

As part of their response to recommendation 1.1.1, which is due for the July 2022 review, they have included action ASX Actions to:

> I. Update policies to include special focus on risk culture and awareness in projects
> II. Provide both short-term and long-term staff education on topic of Risk Culture

ASX advised participants on page 15 of the training presentation pack that 'Application of the Delphi technique to avoid and minimise the potential for 'Group Think' in risk assessments will be introduced in Q4 FY22' i.e., included as a topic of discussion in upcoming long-term education programs.

**ASX Action(s) update Communication Log:**

| Channel | Description | Date |
|---|---|---|
| ASX Delivery Framework Blog Post on Confluence | Communication to introduce Delphi Technique concept | 25/03/2022 |
| Outlook Email | Communication to raise awareness of change and effective use (March ASX Delivery Framework changes) | 28/03/2022 |
| Outlook Email | Communication to Risk Champions - Risk identification and Delphi technique | 13/04/2022 |

## Recommendation 5.1.3: At next upgrade, evaluate need for clean contract baseline with Nasdaq

| | Executed | Appropriate | Sustainable |
|---|---|---|---|
| ASX Action 1 | ✔ | ✔ | ✔ |
| Recommendation Addressed? | Yes | | |
| Comment | Recommendation has been addressed, as evidenced by the findings outlined below. ASX Actions are deemed appropriate and sustainable at the present time. | | |

### Background/Tasks

At the next major upgrade, ASX should evaluate the need to create a clean contractual baseline with Nasdaq to reflect current ways of working, terminology, conditions, schedules.

### ASX Action(s)

1. ASX will clean Nasdaq contract at the next major upgrade. This will be noted and diarised by both Vendor Management and Contract management

### Findings

### ASX Action 1:

ASX entered into a new contract (IT Services Agreement (ITSA)) with Nasdaq in March 2022.

During the Recommendation Review Workshop held on 28 April 2022 (Q&A Review for Recommendation 5.1.3), ASX informed that discussions with Nasdaq ▮▮▮▮▮▮▮▮▮▮▮▮ involved the following high-level process:

- ▮▮▮▮▮▮▮▮▮▮▮▮

▮▮▮▮▮▮▮▮▮▮

In their written response provided on 2 May 2022, ASX gave a view of the proposed timeline at the commencement of the negotiations between both parties ▮▮▮▮▮▮▮▮▮▮▮▮▮. ASX also provided a view of the ASX team involved in the contract negotiations▮

The contract is owned by the Group Executive for Markets, however, responsibility for the day-to-day review of the contract was delegated to the General Manager for Trading & Clearing Services. Responsibility was delegated appropriately to those who had more expertise in particular areas of the contract e.g., technical aspects. ▮▮▮▮▮▮▮▮

In their written response provided on 5 May 2022, ASX confirmed that ▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓ the guidance set out in the Vendor Management Framework is applicable to this contract, and the Contract Owner is responsible for the contract review and administration. ▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓

**ASX Action(s) update Communication Log:**

N/A

# Recommendation 6.2.2: Update central repository for testing documents

| | Executed | Appropriate | Sustainable |
|---|---|---|---|
| ASX Action 1 | ✔ | ✔ | ✔ |
| ASX Action 2 | ✔ | ✔ | ✔ |
| ASX Action 3 | ✔ | ✔ | ✔ |
| Recommendation Addressed? | Yes | | |
| Comment | Recommendation has been addressed, as evidenced by the findings outlined below. ASX Actions are deemed appropriate and sustainable at the present time. | | |

## Background/Tasks

Review and update the central repository for all testing related policies, procedures, methods, tool description, to prove a uniformly accessible source for reference.

## ASX Action(s)

1. Implement a central QE repository for all testing related policies, procedures, methods and tools to provide a uniformly accessible and integrated source for reference for the ASX testing methodology
2. Include demonstration and use of central repository into ASX QE vision, policy, processes and procedures awareness and embedding program
3. Ensure repository is appropriately visible to external parties

## Findings

### ASX Action 1:

Following the recommendation, ASX has created a 'Quality Engineering Repository' which can be accessed via the 'Quality Engineering & Testing

Home' page on the Confluence site. Originally, ASX had a 'Software Testing Governance Home' page, but have deactivated it so that the QE&T Home is the single source location that supports QE&T function.

The QE&T home page is the landing page and entry point for all management system related artefacts that support the 'what, why and how' of the QE&T methodology and identified in a single space the QE&T services provided within ASX.

The main sections of the site are:

- Vision, Policy Strategy
- Shared Services
- Initiatives
- Process & Templates
- QE&T Capabilities
- Governance

ASX has subsequently updated its 'ASX Delivery Framework' to include a link to the QE&T home page (under section titled 'Deliverables - Quality Engineering and Testing) so that it can be easily found and accessed by users.

### ASX Action 2:

ASX has conducted live demonstration sessions of how to use the new central repository at 6 forums:

- 16th March 2022 - Test Management session
- 16th March 2022 - ASX Delivery Framework Working Group session
- 23rd March 2022 - All Testers session #1
- 23rd March 2022 - Solution Engineering session
- 24th March 2022 - All Testers session #2
- 25th March 2022 - Application Support session

In their written response provided on 2 May 2022, ASX stated that for individuals that were not able to attend one of the demonstration sessions, peers would provide support to them. If further support is needed, individuals can contact the email ▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓.

Ongoing, users are supported by the 'About & How to Use this Space' section on the QE&T Confluence space.

**ASX Action 3:**

ASX has designed a process for external parties to request and gain access to the QE central repository on Confluence. ASX has measures in place (via SailPoint) so that the external party user is restricted to the QE&T Confluence space only and without the ability to visit any other Confluence spaces.

In their written response provided on 2 May 2022, ASX stated that external users will have unrestricted access to the central repository and will be able to see all pages on the QE&T Confluence space. ASX added that the repository is a knowledge base for information, and given external users are consumers rather than producers of this knowledge, they will have no need to edit policies, processes and tools. Editing is restricted to members of the group ░░░░░░░░░░░░'.

**ASX Action(s) update Communication Log:**

| Channel | Description | Date |
|---|---|---|
| Outlook Email | Communication announcing launch of new Quality Engineering & Testing repository in Confluence | 31/03/2022 |
| Blog Post on Confluence | Communication posted on QE&T homepage for awareness and future reference | 31/03/2022 |

## Recommendation 6.4.1: Include solution maturity assessment in Design Authority checklist

| | Executed | Appropriate | Sustainable |
|---|---|---|---|
| ASX Action 1 | ✔ | ✔ | ✔ |
| ASX Action 2 | ✔ | ✔ | ✔ |
| Recommendation Addressed? | Yes | | |
| Comment | Recommendation has been addressed, as evidenced by the findings outlined below. ASX Actions are deemed appropriate and sustainable at the present time. | | |

### Background/Tasks

As part of the Design Authority checklist, include a solution maturity assessment that covers the market and technology maturity dimensions.

### ASX Action(s)

1. Enhance architecture process to embed formal indicators of quality risk to guide testing strategy and plan
2. Include "Solution Quality" as an evaluation criteria (including minimum thresholds) in the architecture evaluation process

### Findings

At a meeting on 13 May 2022, ASX's CIO provided information that ASX's interpretation of 'market maturity' (as per IBM's Background/Tasks) refers to market penetration/usage e.g., how often has this technology been rolled out in the market. We adopted the same interpretation to assess the following ASX's Actions.

### ASX Action 1:

ASX has updated their 'Project Risk Assessment (PRA)' template (an excel spreadsheet) to include under the 'Technology' (i.e., Solution

Maturity, covering both market and technology) dimension, a new risk category called 'Software Products and Services' and maturity criteria, to score risk and drive a solution technology maturity assessment at the beginning of the project lifecycle.



This new 'Maturity' criteria acts as a formal indicators of quality risk to guide ASX's testing strategy and plan. ASX has updated their 'Quality Engineering & Testing Policy' on the Confluence site accordingly, as outlined in the findings under ASX Actions 2.

In their written response provided on 2 May 2022, ASX informed that the selection by ASX and management of vendor's capability to provide and deliver a product or service, i.e., Technology – Software Products and Services, is governed by the ASX Vendor Management Framework in conjunction with the ASX Procurement Policy.

### ASX Action 2:

As stated in ASX Action 1, ASX has introduced a new risk category called 'Software Products and Services' and maturity criteria as part of the Project Risk Assessment, to score risk and drive a solution technology maturity assessment at the beginning of the project lifecycle.

ASX has also updated the Design Authority template under the section titled 'DA – Summary Option Comparison (Alignment)', category titled 'Alignment to Architecture', to include a criteria titled 'Degree of Solution Maturity (proposal / project)', to summarise the findings from the Risk Assessment (key risks or concerns identified as part of the review (ACM, domain architect, business case or project team)).

Under section 5 'Quality Engineering Guidelines' of the 'Quality Engineering & Testing Policy' on the Confluence site, ASX has incorporated under 'Design Principles' of the section 'Testing Strategy Assessment and Guidance', that:

- The architecture evaluation process includes solution maturity of vendor software as an evaluation criteria
- Enterprise architecture will perform a risk assessment of vendor software maturity, covering products and services, based on vendor information
- The outcome of the risk assessment is reported to the Design Authority, and as part of the overall project risk assessment process
- The outcomes are also then incorporated into collaborative assessments (by Architecture, Engineering and Testing) of the change impact that will be used to determine the correct change pattern for risk-based testing assessment

**ASX Action(s) update Communication Log:**

| Channel | Description | Date |
|---|---|---|
| Design Authority Meeting | Presentation of changes (new Design Authority template) for information and awareness | 14/03/2022 |
| Test Management Meeting | Changes to the Design Authority template and PRA tabled for discussion and awareness | 29/03/2022 |
| Outlook Email | Communication of new QE transformation items from test management meeting | 30/03/2022 |

## Recommendation 6.4.4: Evaluate need for full DR test before major system release

| | Executed | Appropriate | Sustainable |
|---|---|---|---|
| ASX Action 1 | ✔ | ✔ | ✔ |
| ASX Action 2 | ✔ | ✔ | ✔ |
| Recommendation Addressed? | Yes | | |
| Comment | Recommendation has been addressed, as evidenced by the findings outlined below. ASX Actions are deemed appropriate and sustainable at the present time. | | |

### Background/Tasks

Evaluate the need to update the necessary policies to require that a full ITDR/BCP test be conducted as part of the testing program prior to implementing any major system or raise a formal delivered risk.

### ASX Action(s)

1. Enhance QE policy, processes, procedures and acceptable testing standards for non-functional testing, addressing mandatory testing types such as full ITDR/BCP testing or major systems
2. Integrate mandatory non-functional testing types into delivery risk management processes

### Findings

#### ASX Action 1:

ASX has updated their 'ASX Business Continuity Management (BCM) Exercise Framework' document under section 9.3 'Testing New or Upgraded Systems' to include guidance on the ITDR/BCP requirements for new or existing systems.

The new requirements are:



ASX has also updated their 'Quality Engineering & Testing Policy – Quality Engineering Guidelines' on their Confluence site to link back to the new ITDR/BCP requirements in the BCM Framework. Under section 5 'Non-Functional Test Patterns', the first bullet point under the 'Mandatory Test Patterns' table states that 'The BCM Framework should be consulted to validate if Disaster Recovery Testing can be conducted after the production release date'.

#### Action 2:

ASX has updated their 'Quality Engineering & Testing Strategy – Quality Engineering Strategy' on their Confluence site to include a 'Process and Governance Model' for Risk Based Testing. The 'Risk Based Testing Framework' prescribes the mandatory test types and coverage for Non-Functional Testing depending on project risk, application criticality and change impact. If a project wants to deviate from the prescribed test pattern, it needs to go through the exception process outlined in the framework.

#### ASX Action(s) update Communication Log:

| Channel | Description | Date |
|---|---|---|
| Fortnightly Test Management Meeting | Changed to Non-functional Testing requirements tabled for discussion and awareness | 29/03/2022 |
| Outlook Email | Communication of new QE transformation items from test management meeting | 30/03/2022 |

# Recommendation 6.4.8 Consider using independent expert to review test plan for high risk projects

| | Executed | Appropriate | Sustainable |
|---|---|---|---|
| ASX Action 1 | ✔ | ✔ | ✔ |
| ASX Action 2 | ✔ | ✔ | ✔ |
| ASX Action 3 | ✔ | ✔ | ✔ |
| Recommendation Addressed? | Partially | | |
| Comment | This recommendation has been largely closed with the actions conducted to date. <br><br> While ASX has stated they will be providing ongoing monitoring, reporting and feedback to ASX governance forums (Project SGGs/ESGs, Enterprise Strategic Quality Forum and Project specific Strategic Quality forums, and other forums such as TOSC and ARC if required) to support the implementation of the Recommendation, ASX has not provided evidence that they have reported to their Enterprise Strategic Quality Forum and Project specific Strategic Quality forums or demonstrated that they have been able to maintain this new ongoing process. <br><br> As a result, we are marking the execution and sustainability of ASX Action 3 as 'Partially Addressed' until such time we can confirm that ASX has provided ongoing monitoring, reporting and feedback to the Enterprise Strategic Quality Forum and Project specific Strategic Quality forums, as stated in the 'Independent Specialist Test Strategy Reviews Metrics and Reporting' | | |

section in their QE&T Confluence space, and has been able to manage the new process.

EY will include the completion of this 'Partially Addressed' item in its scope for subsequent reviews.

## Background/Tasks

For complex high-risk projects, consider using an independent specialist party for an independent review of the plan and provide for a wider set of test capabilities in addition to internal testing. For example, for the test strategy and planning, to extend the depth and breadth of risk identification, greater test plan execution coverage.

## ASX Action(s)

1. Establish model and panel for independent specialist review and advice regarding test strategy and plans and inclusion of specialist testing capabilities
2. Update estimation and delivery frameworks to include specialist review
3. Provide ongoing monitoring and reporting and feedback to ASX governance forums (TOSC/ARC), continuous improvement and QE governance

## Findings

### ASX Action 1:

ASX has updated their 'ASX Delivery Framework', under 'Quality Engineering and Testing', to include the new 'Independent Testing Quality Assurance' page on their Confluence site. This page includes the 'Independent Testing Quality Assurance' document which describes the framework for independent testing quality assurance at ASX. It sets out the following:

- What are the goals and the scope of independent test assessments and assurance

- What are the criteria for independent assessments of test strategies and testing processes (e.g., mandatory versus optional, internal versus external), and when an independent assessment should be conducted
- Who conducts the independent assessment and provides assurance and what are the roles and responsibilities in this process
- How will findings and recommendations from the independent assessment process be dealt with

ASX has created the 'Vendor Relationship Management (VRM) – Preferred Suppliers) page on their Confluence site, which contains a published table (panel) of preferred suppliers which can be used to provide independent services, in compliance with ASX's Procurement Policy. The table in the 'VRM – Preferred Suppliers' page explicitly highlights the two (2) areas of:

- Services – Independent testing quality assurance
- Services – Independent specialist test strategy review

ASX has provided evidence that since the establishment of the 'Independent Quality Assurance Framework' and 'VRM – Preferred Suppliers' panel, the new requirements for independent specialist review have been used on projects.

**ASX Action 2:**

The 'Project Initiation Workshop (PIW)' is a mandatory step in the 'Prioritisation & Selection' phase of the ASX Delivery Framework lifecycle to support the initial set-up process to complete the Concept Approval (for seed funding)/Business Case for the initiative.

On the PIW Confluence page, ASX has stated explicitly under the 'Who will attend the project initiation workshop' section, under the second bullet point, that 'Representatives from Technology CoE: Architecture, Testing, Engineering' are required to attend. Under the section 'What is the agenda for the Project Initiation Workshop?', bullet point six, ASX has clearly stated 'Test strategy assurance requirements'. These two updates indicate the inclusion of 'Testing Independent Review of Test

Plan and Test Capabilities' in the early lifecycle of the Prioritisation, Selection & Setup phase of a project.

ASX has also updated the 'Project Risk Management Guidance', under the 'Project Risk Management' section on their Confluence site, to state (under point 1 'Project Risk Assessment (PRA)') that *'the outcome of the Project Risk Assessment will determine requirements for independent and specialist assessments of the project test strategy, which need to be considered as part of the project's schedule, budget and resourcing.'*

ASX has a 'Test Estimation Process' section on their Confluence site, which provides users with a 'Test Estimates Checklist (Test Estimation – Checklist for Consideration)' page to guide them on which estimation template should be used depending on the category of the initiative. The templates are:

- Estimation Template for New Implementation
- Estimation Template for System Upgrade

The 'Test Estimates Checklist' page also includes a 'Indicative Guidance on independent testing quality assurance assessments and specialist test

strategy reviews' table, which provides guidance on type of assurance assessment, indicative effort and indicative budget for external provider, depending on the project size.

**ASX Action 3:**

Within the QE&T Confluence space, ASX has a section titled 'Independent Specialist Test Strategy Reviews Metrics and Reporting'. The two areas covered under this section are:

- Metrics/data to be captured and reported for each external specialist test strategy review

  - Identifies the metrics to measure quality and quantity of Test Strategy development by ASX, reporting and supporting continuous improvement in the manner in which ASX develops a Test Strategy

- Metrics and status will be reported at the following forums

  - Project SGGs/ESGs
  - Enterprise Strategic Quality Forum (to be established in April 2022) - expected to be monthly
  - Project specific Strategic Quality forums

The metrics will also be incorporated into the monthly and quarterly Technology CoE board metrics and reporting. The measurements and reporting will also be able to be reported in other governance forums, such as TOSC (Technology Operations Security Committee) and ARC (Audit and Risk Committee), if required.
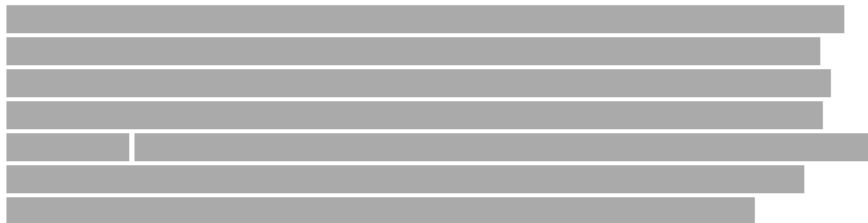
**ASX Action(s) update Communication Log:**

| Channel | Description | Date |
|---|---|---|
| Training Session Meeting | Communication on important updates to the Project Management Framework (Independent Testing Assurance Training Material) | 20/01/2022 |
| Outlook Email | Distribution of Independent Testing Assurance Training Material following training session | 20/01/2022 |
| Blog Post on Confluence | Messaging and announcement to raise awareness and change of Independent Testing Assessment | 24/01/2022 |
| Outlook Email | Communication from Head of Testing (Awareness for new projects - two new processes to independent testing assurance) | 25/01/2022 |
| Outlook Email | Communication between Head of Testing and ERM (Awareness - new independent testing assurance process which will also cover customer testing) | 27/01/2022 |

# Recommendation 6.7.1: Review policy on conformance testing

|  | Executed | Appropriate | Sustainable |
|---|---|---|---|
| ASX Action 1 | ✔ | ✔ | ✔ |
| ASX Action 2 | ✔ | ✔ | ✔ |
| Recommendation Addressed? | Yes | | |
| Comment | Recommendation has been addressed evidenced by findings outlined below. ASX Actions are deemed appropriate and sustainable at the present time. | | |

## Background/Tasks

Review the policy to consider whether mixing any form of customer testing with go-live weekend activities is appropriate for critical new system deliveries.

## ASX Action(s)

1. A review of the nature and reason for any customer 'testing' on go-live weekends will be undertaken
2. Any findings from this will be updated in relevant testing and Project Governance policies

## Findings

### ASX Action 1:

ASX has performed a review of their testing policy and created a new document called 'Customer Testing Requirements'. This document provides guidance and scenarios that project team members (i.e., platform owners, project owners, project managers, testing teams and customer technical support teams (CTS)) should consider to determine what customer testing would be required to support various testing activities in preparation for a platform or service upgrade.

The customer testing types covered in the document are:

- Standard Test Platform Access
- Self Testing
- Conformance Testing (Accreditation)
- Industry Wide Testing (IWT)
- Dress Rehearsals (DRs)
- Go-live Weekends

The guidance documents also details the attestation process for customer testing:

- For small projects, the attestation can be an email
- For larger projects, the standard attestation template (PDF format) provided by ASX will need to be completed and signed by a senior person presenting the customer entity

During the Recommendation Review Workshop held on 28 April 2022 (Q&A Review for Recommendation 6.7.1), ASX informed that the list of customer testing types they use has been built up over time in consultation with customers based on what customers feel works best for them, as well as what ASX determines is required from a project point of view. Additionally, ASX has looked at what other exchanges around the world use for customer testing and have informed that the testing types ASX use are typical of those used by other exchanges.

Furthermore, during the workshop, ASX also explained that there are exceptions that can be made when it comes to customer testing. If a customer requests for additional testing to be done, this is something ASX will take into consideration and make available if appropriate. Similarly, if a customer feels that there should be less testing, ASX will make a determination on that as well, keeping in mind that ASX's role is to protect the market and not an individual customer.

### ASX Action 2:

ASX has updated their 'Quality Engineering & Testing Policy – Quality Engineering Guidelines' on their Confluence site to include a new section titled 'Customer Testing', incorporating the newly established guidelines and attestations (as stated in Action 1) required for customer testing.

The new section defines the objectives, design principles and refers to the exemption process if a mandatory customer test type is elected not to be done. ASX has also updated their 'Quality Engineering Strategy – Testing Methodology' page on Confluence, to describe how ASX and customer testing activities intersect, the different types of customer testing, how it fits into the ASX risk-based testing methodology and the benefits of customer testing.

Subsequently, the 'Quality Engineering Strategy – Risk Based Testing' page on the Confluence site has also been updated to include a new sub section called 'Customer Change Pattern Reference' and child page titled 'Customer Change Characteristic', providing an additional layer of guidance on what types of customer testing is required based on the change scope. Under the 'Quality Engineering Strategy – Risk Based Testing' page, the section titled 'Risk Based Testing Treatment Definitions' has also been updated to include 'Customer Testing – All specified by Customer Change Pattern.'

Furthermore, ASX has updated their 'Quality Engineering Strategy – Approach' page on their Confluence site to incorporate a 'Test Levels versus Test Scope' sub-section, with Customer Testing included clearly as part of the new section.

**ASX Action(s) update Communication Log:**

| Channel | Description | Date |
|---|---|---|
| Fortnightly Test Management Meeting | Changed to Non-functional Testing requirements tabled for discussion and awareness | 29/03/2022 |
| Outlook Email | Communication of new QE transformation items from test management meeting | 30/03/2022 |

## Recommendation 7.1.1: Ahead of and during an outage, identify conditions under which certainty provided to customer by closing for entire day

|  | Executed | Appropriate | Sustainable |
|---|---|---|---|
| ASX Action 1 | ✔ | ✔ | ✔ |
| Recommendation Addressed? | Yes | | |
| Comment | Recommendation has been addressed evidenced by findings outlined below. ASX Actions are deemed appropriate and sustainable at the present time. | | |

**Background/Tasks**

During an outage where the Market is not in a fully open state, identify what length of time would require a default decision of closing the market and performing end of day activities, unless there are other overriding circumstances.

**ASX Action(s)**

1. Establish a working group to consider options for managing the market in the event of an extended outage, and bring back a proposal on how to provide additional clarity to market users

**Findings**

ASX Action 1:

The working group established by ASX has produced a 'Market Closure Assessment - Decisions and Communication' document which is a framework that ASX will use during a market outage. The framework identifies conditions and provides certainty to customers as to whether the market will be closed for the remainder of the day.

In the document, under section 'Decisions - Who and When', ASX has proposed that the decision of whether to close the market or continue resolving the issue will be considered every 45 minutes from the initial market disruption up until 13:30. ASX has stated in their 'Summary Consolidation Page' that they intend to undertake market consultation in June 2022 to obtain feedback on the contents and the 13:30 cut-off time.

The working group has also created a 'Market Closure Assessment - Decision Tool', which is an excel spreadsheet containing and interactive decision tree tool with intraday checkpoints for use during an outage when the markets is in the 'Enquire' session state. This artefact supports the management of decision making to either recover the market, or decide ASX Trade will not re-open for the remainder of the day. ASX has noted in their 'Summary Consolidation Page' that they performed a fire drill held on 25 March 2022 and used the decision tool to guide timing and decision making.

Furthermore, ASX has referenced in their 'ASX Trade Procedures' document, under section 6 'Assessment for Market Closure', the new 'Market Closure Assessment framework', formalising the process. ASX have shown evidence that both of the newly created artefacts are available in the 'Ops Procedures Home' library site to use.

At a meeting on 12 May 2022, ASX provided information that if a market outage were to happen, the newly created process has been embedded into ASX's day to day procedures and be would be followed to manage the outage, and market participants will be informed by 13:30, if not earlier, on whether the market will reopen.

Additionally, according to information provided by ASX at the same meeting, when creating the framework and decision tree, ASX had sessions with various industry bodies and groups and their internal Equity Market Operations working group to obtain feedback. One of the main goals of the June 2022 consultation will be to obtain feedback on the proposed 13:30 cut-off time. It had originally been 14:30, however after initial feedback from regulators, it was brought forward to 13:30.

EY do not believe it is reasonable to assume an outage will be required or witnessed in the near future to justify holding the sustainability dimension in a 'partially met' state indefinitely.

**ASX Action(s) update Communication Log:**

| Channel | Description | Date |
|---|---|---|
| MS Teams Conference | Market Closure Assessment Fire Drill to demonstrate key stakeholder communication and learning | 25/03/2022 |

## Appendix A    Recommendation review workshops list

| # | Date | Meeting Title |
|---|---|---|
| 1 | 21/04/2022 | ASX Remedial Actions - Q&A Review for Recommendation 6.4.8 |
| 2 | 28/04/2022 | ASX Remedial Actions - Q&A Review for Recommendation 5.1.3 |
| 3 | 28/04/2022 | ASX Remedial Actions - Q&A Review for Recommendation 6.7.1 |
| 4 | *(Workshop not held, written response provided)* | ASX Remedial Actions - Q&A Review for Recommendations 1.2.6 & 1.3.6 |
| 5 | *(Workshop not held, written response provided)* | ASX Remedial Actions - Q&A Review for Recommendation 6.2.2 |
| 6 | *(Workshop not held, written response provided)* | ASX Remedial Actions - Q&A Review for Recommendation 6.4.1 |
| 7 | *(Workshop not held, written response provided)* | ASX Remedial Actions - Q&A Review for Recommendation 6.4.4 |
| 8 | *(Workshop not held, written response provided)* | ASX Remedial Actions - Q&A Review for Recommendation 7.1.1 |
| 9 | 12/05/2022 | Q2 ASX IBM Recommendations: EY IE Draft Report Factual Accuracy Check Review |
| 10 | 13/05/2022 | Recommendation 6.4.8 - IE Findings Review |

## Appendix B    Interviewed ASX stakeholders list

| Role |
| --- |
| Chief Risk Officer |
| Group Executive, Technology and Data and CIO |
| Group Executive, Markets |
| Chief Technology Officer |
| General Manager, Trading & Clearing Services |
| General Manager, Customer and Technical Operations |
| General Manager, Market Operations |
| Head of Quality Engineering |
| Senior Officer, Strategic Sourcing |
| Senior Legal Counsel & Senior Manager |
| Project Manager, Enterprise Delivery |
| Project Manager, IBMR |

## Appendix C    Recommendations Questionnaire submitted to ASX post SMR documentation review

# Appendix D     Documents reviewed

# Appendix E    Status summary of all 59 Recommendations

ASX has submitted thirty-one (31) Recommendations for closure to date. Out of the thirty-one (31) Recommendations, twenty-four (24) Recommendations have been deemed 'fully addressed' and closed, with seven (7) Recommendations deemed as 'partially addressed' and requiring further evaluation in upcoming quarterly review periods.

The Design Adequacy ("DA") Report submitted on 27 April 2022 identified that 13 Recommendations out of the remaining 37 Recommendations yet to be submitted, were partially addressed and did not have ASX Actions fit for purpose to address the IBM Recommendations. In order for ASX to fully address the Recommendations during the relevant quarterly submission period, ASX should take into consideration the IE recommendations for those partially addressed Recommendations in the DA Report.

Below is an overview of each of the 59 Recommendations and their closure / submission status at the end of the second quarterly review period (13 May 2022):

| # | Reference | IBM Recommendation | DA Report - Actions Fit for Purpose? | Status |
|---|-----------|--------------------|--------------------------------------|--------|
| | | **1. Risk Related Recommendations** | | |
| 1 | 1.1.1 | Enhance the risk aware culture, where risks and issues are freely identified, documented, analysed, managed and treated appropriately. | Partial | Pending submission. |
| 2 | 1.2.1 | Ensure that ERM Line 2 resources assigned to projects have sufficient expertise such that they can provide adequate oversight and challenge to the project. Post the Project Risk Assessment (PRA) exercise, a suitable ERM Line 2 expert or set of experts should then be assigned to the project, based upon the detailed understanding of the scope. | N/A | Reviewed in Q1 2022. Further evaluation required in Q3 2022. |
| 3 | 1.2.2 | Update the necessary policies to ensure that at project initiation and especially during the Project Risk Assessment phase, resources with relevant risk expertise should be involved to leverage their diverse expertise. | Yes | Pending submission. |
| 4 | 1.2.3 | Enhance the control framework to ensure that there are suitable controls, alternative and independent viewpoints during the Project Risk Assessment template completion exercise and/or after the template completion by the project teams. This will add alternative diverse viewpoints, and is also a means to the challenge the team's rationale. Consider the use of the Delphi technique to independently complete the form, and use the average output or use the range, to reduce risk of groupthink. This is also relevant to the Process Risk Assessment exercise. | Yes | Pending submission. |
| 5 | 1.2.4 | Update the necessary policies to ensure that the risks highlighted in the Project Risk Assessment are transferred to the delivery risk register. This is also relevant to the Process Risk Assessment exercise. | N/A | Reviewed and closed in Q1 2022. |
| 6 | 1.2.5 | Expand the scope of the Project Risk Assessment template to consider both delivery risk and the future delivered risk, to also include the transition/migration/cut-over risks. | Partial | Pending submission. |

| # | Reference | IBM Recommendation | DA Report - Actions Fit for Purpose? | Status |
|---|---|---|---|---|
| 7 | 1.2.6 | Review the categorisation and differences in approach between the various project priority levels to ensure it is suitable against risk appetite and control needs. | Yes | Reviewed in Q2 2022. Further evaluation required in a future quarter. |
| 8 | 1.3.1 | Update the necessary policies to ensure that the Project Risk Assessment and Process Risk Assessment are revisited at key points in the delivery project, as this will provide an additional set of risk identification dimensions that may have been omitted by the delivery team. | N/A | Reviewed and closed in Q1 2022. |
| 9 | 1.3.2 | Ensure that risks are identified and logged from key sources, such as the Project Risk Assessment, Process Risk Assessment, Governance functions meetings and minutes, delivery team stand-ups, independent teams, ERM Line 2, Internal Audit/Line 3. | N/A | Reviewed and closed in Q1 2022. |
| 10 | 1.3.3 | Ensure that the full project risk and issue log metrics are shared with the governance functions - e.g. number of open risks, number of risk owners, number of risks in delivery vs risks in change, categorisation of risks (e.g. how many are strategic vs delivery, how many are infrastructure vs personnel, how many are supplier versus in-house) in addition to the key risks that the project team deem material. | N/A | Reviewed and closed in Q1 2022. |
| 11 | 1.3.4 | Ensure that key roles and responsibilities are included in the governance functions through the use of a RACI aligned to Project Priority and Risk Assessment, for example, as it relates to the test function to ensure independence, focus and continuity. | Yes | Pending submission. |
| 12 | 1.3.5 | Ensure that the ERM Line 2 function (could be more than one person) are invited by the project delivery team in good time, ideally contributing in the preparation workshops, business case production and project risk assessment exercises. | N/A | Reviewed and closed in Q1 2022. |
| 13 | 1.3.6 | Project risks should periodically be identified using a Delphi-style technique to reduce risk of group think and normalcy biases. Other risk identification techniques described in ISO 31010 should also be considered at key project milestones. Risk identification should also be tagged against standard categories, to enable reporting of categorisation coverage to control functions. | Partial | Reviewed in Q2 2022. Further evaluation required in a future quarter. |
| 14 | 1.3.7 | Update the implementation readiness templates and supporting guidance, such that the risks in the implementation readiness document clearly highlights whether they are inherent or residual in nature. The likelihood and impact assessment should be noted, to produce the risk rating. Controls/treatments should be tagged clearly as whether having been performed (preventative) or actions to take should an event occur (detective / corrective). In addition, the listed risks should have lineage to the project risk register. | Partial | Pending submission. |
| 15 | 1.3.9 | Ensure that project risks, issues and statistics are tracked to completion and reported to governance functions in a timely function - e.g. average time to close issues, longest open issue, ownership quantities, number of open risks. | N/A | Reviewed and closed in Q1 2022. |
| 16 | 1.3.10 | Project risks should be quantified in likelihood and impact terms, according to standard definitions of risk assessment. | N/A | Reviewed and closed in Q1 2022. |
| 17 | 1.4.1 | Ensure that Technical Account Managers formally document risks and issues from customers/participants so such information can be factored into Executive decision making. | Yes | Pending submission. |
| | | **2. Governance Related Recommendations** | | |

| # | Reference | IBM Recommendation | DA Report - Actions Fit for Purpose? | Status |
|---|-----------|--------------------|--------------------------------------|--------|
| 18 | 2.1.1 | Document the key roles and functions that must be in attendance of a governance function, based on the risk, complexity, priority and needs of the project. In addition, include roles independent from the project and ideally the organisation. | N/A | Reviewed and closed in Q1 2022. |
| 19 | 2.1.2 | Evaluate the need to update the necessary policies to require an independent viewpoint, that the delivery team and its reporting line cannot exceed a given percentage of the total governance function membership. | N/A | Reviewed and closed in Q1 2022. |
| 20 | 2.1.3 | Evaluate the need to update the policies to require that for Priority 1 and High-Risk projects key governance functions have dedicated meetings that only cover the project. | N/A | Reviewed and closed in Q1 2022. |
| 21 | 2.1.4 | Update the policies such that the governance forums check that the project is tracking and reporting against the metrics defined at project initiation. | N/A | Reviewed and closed in Q1 2022. |
| | | **3. Delivery Related Recommendations** | | |
| 22 | 3.1.1 | At project initiation, formally determine metrics that are carried over, and tracked during project delivery defining the boundaries of operation. Examples include financial variance, product quality, business outcomes, risks, productivity, delivery quality, earned value, customer satisfaction and schedule. | Yes | Pending submission. |
| 23 | 3.1.2 | Produce a due diligence checklist to increase scope of coverage and to capture material lessons learned. | N/A | Reviewed and closed in Q1 2022. |
| 24 | 3.1.3 | Update the project delivery process and policies to require that prior Post Implementation Reviews/Lessons Learned are considered, especially in the initiation phases of the project. | N/A | Reviewed and closed in Q1 2022. |
| 25 | 3.1.4 | Update the project delivery process and policies to require that for priority 1 projects the Enterprise Project Management Office (EPMO) team is directly involved from initiation in establishing, for example, the delivery framework, reporting, risk/issues register, financial management systems. | N/A | Reviewed and closed in Q1 2022. |
| 26 | 3.2.1 | Implement risk-based paths for project delivery, tied to the PRA assessment and periodic review of the PRA. For example, medium and high-risk projects should execute the product development lifecycle differently, with variance in scope, control needs or constraints, e.g. pooled vs dedicated staff. The Project Risk Assessment is the right foundation for assessing the risk in delivery and change. A High-Risk project could have a mandatory independent assessment at certain key gates for example, the depth of requirements that need to be produced could also be linked to the risk rating. | Yes | Pending submission. |
| 27 | 3.2.2 | Investigate and determine the benefits of formalising upon quality management framework (e.g. ISO 9001 or similar), for embedding into project process and policies. | Partial | Pending submission. |
| 28 | 3.2.3 | Update the policies such that for Priority 1 projects the EPMO team is part of the governance functions to ensure compliance to ASX's processes, this is to ensure quality before a Line 3 audit is involved. | Yes | Pending submission. |
| 29 | 3.2.4 | Consider enhancing the policies such that for Priority 1 and Medium/High Risk projects, governance related reporting frequency is increased to every 2 weeks. In addition, consider the move to a dynamic dashboard style reporting rather than document-based. | N/A | Reviewed and closed in Q1 2022. |

| # | Reference | IBM Recommendation | DA Report - Actions Fit for Purpose? | Status |
|---|---|---|---|---|
| 30 | 3.2.5 | Delivery gaps should be challenged and highlighted by the governance, delivery, and EPMO functions during delivery addressed prior to Line 3 internal or external audit involvement. | Yes | Pending submission. |
| 31 | 3.2.6 | Update the policies such that Priority 1 projects are required to be run by in-house project managers who have detailed knowledge of the ASX delivery processes, procedures and tools. If this is not viable, then an EPMO member should be accountable for compliance to the project delivery processes. | N/A | Reviewed and closed in Q1 2022. |
| 32 | 3.2.7 | Ensure that key go-live related meetings are minuted and actions are clearly documented. | N/A | Reviewed and closed in Q1 2022. |
| | | **4. Requirements Related Recommendations** | | |
| 33 | 4.1.1 | ASX should maintain their own detailed requirements log to mitigate against over reliance upon a single vendor and in case ASX would ever need to change supplier. This log would provide a means to validate the vendors position and would be in addition to the test cases, documenting non-functional, process, integration as well as functional needs. | N/A | Reviewed and closed in Q1 2022. |
| | | **5. Vendor Management Related Recommendations** | | |
| 34 | 5.1.1 | Perform contract acceptance at the end of the project lifecycle, once integration and end-to-end testing have also been factored in. This would also increase the percentage of test cases and automated test cases available to execute with greater confidence. We note that this is subject to existing contractual terms and obligations, so may not always be possible. | N/A | Reviewed in Q1 2022. Further evaluation required in Q3 2022. |
| 35 | 5.1.2 | Create guidelines for supplier related contract acceptance testing e.g. X% of the final functional and non-functional test cases must be available to start the process, e.g. Y% of functional and non-functional test cases must be automated. | N/A | Reviewed in Q1 2022. Further evaluation required in Q3 2022. |
| 36 | 5.1.3 | At the next major upgrade, ASX should evaluate the need to create a clean contractual baseline with Nasdaq to reflect current ways of working, terminology, conditions, schedules. | Yes | Reviewed and closed in Q2 2022. |
| | | **6. Testing Related Recommendations** | | |
| 37 | 6.1.1 | Create a program to raise awareness of the ASX Testing Vision: "ASX is entrusted to operate systemically important national infrastructure with a near zero appetite for service disruption on many of our services. Customer and industry testing is critical and ongoing customer confidence must be instilled and maintained through early quality." | Yes | Pending submission. |
| 38 | 6.1.2 | Establish an independent testing quality assurance service for internal projects. | Yes | Pending submission. |
| 39 | 6.1.3 | Design, document and implement a Continuous Test Process Improvement process. | Yes | Pending submission. |
| 40 | 6.2.1 | Enhance in-house capabilities for combinatorial testing strategies, methods, tools and datasets to combine functional, negative-functional, non-functional and operational testing at volume with representative data (real or simulated) in an end-to-end environment to create "production-like" testing scenarios targeted at reducing the risk of latent defects causing catastrophic failures in production situations. | Yes | Pending submission. |
| 41 | 6.2.2 | Review and update the central repository for all testing related policies, procedures, methods, tool description, to prove a uniformly accessible source for reference. | Yes | Reviewed and closed in Q2 2022. |

| # | Reference | IBM Recommendation | DA Report - Actions Fit for Purpose? | Status |
|---|---|---|---|---|
| 42 | 6.3.1 | Describe role-based ASX test training program within the ASX test policy that supports the ASX test policy and guidelines, the ASX test methodology, and their concepts. | Partial | Pending submission. |
| 43 | 6.3.2 | Define and document the risk-based testing approach and techniques in the testing policy. | Yes | Pending submission. |
| 44 | 6.3.3 | Adopt an overarching and detailed ASX Test Methodology which includes templates, methods and processes, job role and guidelines to ensure any compliance to ISO29119 guidelines. | Yes | Pending submission. |
| 45 | 6.4.1 | As part of the Design Authority checklist, include a solution maturity assessment that covers the market and technology maturity dimensions. | Partial | Reviewed and closed in Q2 2022. |
| 46 | 6.4.2 | Engage the market to understand the benefits and demand for the re-introduction of a performance testing environment. Post market engagement, determine the required implementation, if any. | Yes | Pending submission. |
| 47 | 6.4.3 | The final IWT/DR test weekend for High Priority projects should be more co-ordinated in nature between Participants, whilst preceding weekends remain for conformance testing purposes. For example, suggest partitions, instruments, product types and scenarios that Participants share to ensure matching. | Partial | Pending submission. |
| 48 | 6.4.4 | Evaluate the need to update the necessary policies to require that a full ITDR/BCP test be conducted as part of the testing program prior to implementing any major system or raise a formal delivered risk. | Yes | Reviewed and closed in Q2 2022. |
| 49 | 6.4.5 | Create a detailed interface and integration log, and for high importance interfaces ensure that end-to-end test coverage is completed. Where interfaces are not tested, then a clear rationale should be identified, the risk should be logged in the risk register and added to the implementation readiness document. Require that all high-risk feeds and interfaces, internal and external must be included in integration and end-to end tests using test or live feeds rather than a virtualised or simulated stub. | Partial | Pending submission. |
| 50 | 6.4.6 | Design, document and implement a test selection and prioritisation process supported by test design optimization methods and/or combinatorial test tools. | Yes | Pending submission. |
| 51 | 6.4.7 | Document a test planning guide that prompts delivery teams to consider a wider coverage of the requirements due to inherent risks and complexities involved. For example, consider dynamic functional scenarios e.g. at start of day, in a slow market, in a very fast market, with many cancels, in a top of book scenario, in a non-top of book scenarios, across partition. | Yes | Pending submission. |
| 52 | 6.4.8 | For complex high-risk projects, consider using an independent specialist party for an independent specialist party for an independent review of the plan and provide for a wider set of test capabilities in addition to internal testing. For example, for the test strategy and planning, to extend the depth and breadth of risk identification, greater test plan execution coverage. | Yes | Reviewed in Q2 2022. Further evaluation required in a future quarter. |
| 53 | 6.5.1 | Institute on-going defect analysis techniques (including defect prediction and defect modelling). Work with production tracking systems to accurately track Defect Leakage into production. Define and implement a method of linking defects to specific releases, tests and business functions. Begin tracking Defect Removal Efficiency into UAT and Production and Mandate Root Cause recording in defect analysis. | Partial | Pending submission. |

| # | Reference | IBM Recommendation | DA Report - Actions Fit for Purpose? | Status |
|---|-----------|-------------------|--------------------------------------|--------|
| 54 | 6.5.2 | Design and implement a rigorous quality metrics framework and testing quality index for both Testing (Product Quality) and Quality Assurance (Process Quality). | Yes | Pending submission. |
| 55 | 6.5.3 | Design, document and implement a test coverage tracking approach to measure coverage of tests to be executed. Apply the tracking to the current base of test cases to ensure proper coverage. | Partial | Pending submission. |
| 56 | 6.5.4 | Create metric-based definitions for the Quality Sentiment in the test reports to understand the difference between ratings (e.g. Defined difference between good and average). Additionally, identify what actions should be taken as a result of a Quality Sentiment rating. | Yes | Pending submission. |
| 57 | 6.6.1 | Ensure ASX Trade included in next annual ITDR exercise to increase confidence. | N/A | Reviewed in Q1 2022. Further evaluation required in Q3 2022. |
| 58 | 6.7.1 | Review the policy to consider whether mixing any form of customer testing with go-live weekend activities is appropriate for critical new system deliveries. | Partial | Reviewed and closed in Q2 2022. |
| | | **7. Testing Related Recommendations** | | |
| 59 | 7.1.1 | During an outage where the Market is not in a fully open state, identify what length of time would require a default decision of closing the market and performing end of day activities, unless there are other overriding circumstances. | Partial | Reviewed and closed in Q2 2022. |

# Appendix F    Release Notice

Ernst & Young ("EY") was engaged on the instructions of ASX Operations Pty Ltd ("ASX", "Client" or "you") to conduct an Independent Assessment of ASX's Actions to address the IBM Recommendations ("Project"), in accordance with the engagement agreement dated 22 December 2021 including the General Terms and Conditions ("the Engagement Agreement").

The results of EY's work, including the assumptions and qualifications made in preparing the report, are set out in EY's report dated 13 May 2022 ("Report").  ASX and ASX's regulators ASIC and the RBA, should read the Report in its entirety including any disclaimers and attachments. A reference to the Report includes any part of the Report. No further work has been undertaken by EY since the date of the Report to update it.

Unless otherwise agreed in writing with EY, access to the Report is made only on the following basis and in either accessing the Report or obtaining a copy of the Report the recipient agrees to the following terms.

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2.  EY disclaims all liability in relation to any other party who seeks to rely upon the Report or any of its contents.

3.  EY has acted in accordance with the instructions of ASX, in conducting its work and preparing the Report, and, in doing so, has prepared the Report for the benefit of the ASX and ASX's regulators ASIC and the RBA, and has considered only the interests of ASX and ASX's regulators ASIC and the RBA.  EY has not been engaged to act, and has not acted, as advisor to any other party.  Accordingly, EY makes no representations as to the appropriateness, accuracy or completeness of the Report for any other party's purposes.

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