

# ASX Limited

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

12 May 2023

### **LIMITATION**

The findings contained in this Independent Expert Report are based on the findings of the report prepared at the request of ASX Limited solely for the purpose of providing an Independent Assessment of ASX's Actions to address the IBM Recommendations, and is not appropriate for use for other purposes. This report is provided for information purposes only in order to provide details of the findings reported to the ASX Limited and should not be taken as providing specific advice on any issue, nor may this be relied upon by any party other than ASX Limited and ASX's regulators ASIC and the RBA. In carrying out our work and preparing this report Ernst & Young has worked solely on the instructions and information of ASX Limited, and has not taken into account the interests or individual circumstances of any party other than ASX Limited and ASX's regulators ASIC and the RBA. Ernst & Young does not accept any responsibility for use of the information contained in this report and makes no guarantee nor accept any legal liability whatsoever arising from or connected to the accuracy, reliability, currency or completeness of any material contained herein. Ernst & Young expressly disclaims all liability for any costs, loss, damage, injury, or other consequence which may arise directly or indirectly from the use of, or reliance on, this Report.

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# 1. Executive Summary

## Reporting summary for quarter

Our assessment found that ASX has once again made significant and appropriate progress towards addressing and implementing the IBM Review Recommendations (“IBMRs” or “Recommendations”) with fifty-six (56) of the fifty-nine (59) total Recommendations complete after this submission. The ASX Delivery Excellence Program (“the Program”) continues to be well run, has the appropriate governance and oversight, and is staffed and supported by individuals focused on meeting its deadlines. Highlights from this quarter’s submission from the Program include:

- 1) Closed two (2) IBMRs with a 100% pass rate, and
- 2) Finalised and closed two (2) carryover Recommendations (items previously determined to be incomplete) out of two (2) resubmitted from prior quarterly reviews.

Our previous quarterly reports highlighted the ongoing risk that the Program may not fully close all fifty-nine (59) Recommendations at the end of the final quarter (Q7) in June 2023, mainly due to:

- 1) the complexity of the Q7 Recommendations and,
- 2) difficulty meeting the ‘Sustainability’ measure in our assessment

This quarter (Q6), ASX continued to mitigate some of the risk by bringing forward one (1) Recommendation that was originally planned to be submitted in June 2023 (next quarter), thus reducing the remaining Recommendations from four (4) to three (3). ASX also initiated discussions about the remaining Q7 Recommendations and have stated they intend to provide early sight (i.e., drafts) of their submissions to get advanced feedback from EY in order to better ensure they can fully close the Q7 Recommendations.

We continue to acknowledge the ongoing risk of the Program not closing all recommendations in the final quarter, however, considering the ASX Delivery Excellence Program has closed all submitted Recommendations

to date and has achieved two consecutive quarters with a 100% pass rate for new submissions and resubmissions, we believe that ASX has improved their chances to close all 59 Recommendations in the final quarter.

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.

## Historic findings and recommendations

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

Below is a summary of the outcomes from our quarterly reports to date:

Period	Submissions		Fully Addressed				Partially Addressed	
	IBMR	Actions	IBMR	%	Actions	%	IBMR	Actions
Q1	22	49	18	82%	44	90%	4	5
Q2	9	23	6	67%	20	87%	3	3
Q3	12	37	5	42%	26	70%	7	11
Q4	6	27	4	67%	24	89%	2	3
Q5	5	20	5	100%	20	100%	0	0
Q6	2	7	2	100%	7	100%	0	0
<b>Total</b>	<b>56</b>	<b>163</b>	<b>40*</b>		<b>141*</b>			

Please note, '%' refers to '% fully completed'.

\* Excludes partially addressed IBMRs and ASX Actions from previous quarters that were re-submitted by ASX in subsequent quarterly review periods for re-evaluation.

This summary shows that ASX has continued to improve their percentage of fully addressed IBM Recommendations and ASX Actions as all Recommendations this quarter were fully closed again. All partially addressed Recommendations from Q1, Q2, Q3 and Q4, total of sixteen (16), have now been resubmitted by ASX and assessed by EY as fully addressed. For details and commentary, please refer to Appendix F 'Summary of Closed Partially Addressed Recommendations and ASX Actions from previous quarterly review periods'.

For detailed progress of the fifty-nine (59) Recommendations please refer to Appendix E 'Status summary of all 59 Recommendations'.

Furthermore, all four (4) IE Recommendations from the April 2022 Design Adequacy Report have been assessed as fully addressed as part of the Q3 and Q5 evaluations. For details and commentary, please refer to Appendix G 'Summary of Closed Design Adequacy Report IE Recommendations' of this report.

## 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 fifty-nine (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 181 actions ("ASX Action") to address the fifty-nine (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.

## 2. Introduction

### 2.1 Background

#### Recommendations Review

To address the fifty-nine (59) IBM Recommendations, ASX subsequently developed a management response plan which consists of 181 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 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 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:** Workshops 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 to 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 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

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 and/or appropriate and/or sustainable following a re-submission by ASX and re-evaluation by the IE.

All partially addressed Recommendations from Q1, Q2 and Q3, that total fourteen (14), have now been resubmitted by ASX and assessed by EY as fully addressed. For details and commentary, please refer to Appendix F ‘Summary of Closed Partially Addressed Recommendations and ASX Actions from previous quarterly review periods’. Further, all actions recommended in the Design Adequacy check have been addressed in prior quarters.

The below provides detail on the partially addressed Recommendations from Q4.

#### Q4 September 2022

In the fourth quarterly report submitted by ASX on 13 October 2022, we identified two (2) out of the six (6) submitted Recommendations as needing further evidence in future quarters for re-evaluation: 1.3.4 and 3.2.1.

This quarter, ASX has submitted both Partially Addressed Recommendations for re-evaluation in Q6 and below are the re-evaluation outcomes:

#### 1.3.4 - Ensure key roles & responsibilities are included in PSG

1. Include as a topic of discussion in the Risk culture and awareness short and long-term education session in response 1.1.1-2
2. Update Project Governance to include RACI matrix aligned to Scaled PM Framework

3. Update the Expectations of Line 2 on PSGs to challenge on this topic

	Executed	Appropriate	Sustainable
ASX Action 1	✓	✓	✓
ASX Action 2	✓	✓	✓
ASX Action 3	✓	✓	✓
Recommendation Addressed?	Partially		
Comment	<p>This recommendation has been largely closed with the actions conducted to date.</p> <p>For ASX Action 2, while ASX has created the ‘Project Deliverable RACI’ template and aligned it to the new Scaled Project Management Framework (see Recommendation 3.2.1 for details), the new framework and associated templates were recently launched on 1 November 2022, and ASX has not yet transitioned all in-flight projects to the new framework and templates. Although, ASX currently does have early adopters (i.e., projects that started in September 2022 or October 2022) which have already started using the new framework and templates, at the time of writing this report, these projects had not yet reached the stage of producing the ‘Project Deliverable RACI’.</p> <p>As a result, we are marking the sustainability of ASX Action 2 as ‘Partially Addressed’ until such time we can confirm that ASX has transitioned in-flight projects onto the new framework and templates, and projects have produced the ‘Project Deliverable RACI’.</p> <p>EY will include the completion of this partially addressed item in scope for subsequent reviews.</p>		

<b>Outcome from Q6 Re-evaluation</b>	Fully Addressed
<b>Comment</b>	<p>This Recommendation is now fully addressed. Since the launch of the Scaled PM Framework in November 2022, projects have reached the stage of producing the 'Project Deliverables RACI Matrix'. ASX has provided evidence that the following projects have completed the 'Project Deliverables RACI Matrix':</p> <ul style="list-style-type: none"> <li>■ [Redacted]</li> <li>■ [Redacted]</li> <li>■ [Redacted]</li> <li>■ [Redacted]</li> </ul> <p>During the Q4 submission, ASX had also created an Implementation Roadmap for the new Scaled PM Framework. According to the plan, EPMO would help inflight projects transition to the new framework and templates by the end of March 2023 after the proposed project tier had been formally endorsed by the November 2022 PGG. ASX stated that no project ending within six (6) months from November 2022 would be transitioned to the new Scaled PM Framework and would continue to follow the previous framework until the project is completed.</p> <p>As stated in the updated findings for Recommendation 3.2.1 (also resubmitted this quarter), the list presented at the November 2022 PGG was formally endorsed.</p> <p>In the written responses provided by ASX on 1 May 2023 and 3 May 2023, ASX included attestations from both the ASX General Manager of Enterprise Delivery and the ASX Head of EPMO that the transition to the new Scaled PM</p>

	<p>Framework has been completed for the inflight projects from the November 2022 PGG.</p> <p>Further, at EY's request, ASX sent through evidence on 5 May 2023 from a sample of transitioned projects (3 projects), and EY has been able to validate these projects are now following the new Scaled PM framework.</p>
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### 3.2.1 - Implement risk based pathways for project delivery tied to PRA

1. EPMO Lead to be recruited (New Headcount)
2. Design and build a scaled PM Framework (and associated templates) that outlines the mandatory PM Framework deliverables and governance required throughout the Delivery Lifecycle and aligned to the Risk and Complexity of a project

	Executed	Appropriate	Sustainable
<b>ASX Action 1</b>	✓	✓	✓
<b>ASX Action 2</b>	✓	✓	✓
<b>Recommendation Addressed?</b>	Partially		
<b>Comment</b>	<p>This recommendation has been largely closed with the actions conducted to date.</p> <p>For ASX Action 2, while ASX has designed and built a new Scaled Project Management Framework with associated templates, these were recently launched on 1 November 2022, and ASX has not yet transitioned all in-flight projects to the new framework and templates. However, ASX currently does have early adopters (i.e., projects that started in September 2022 or October 2022) which have already started using the new framework and templates.</p>		

	<p>As a result, we are marking the sustainability of ASX Action 2 as 'Partially Addressed' until such time we can confirm that ASX has completed the November 2022 governance cycle, in order to validate the proposed tiering rating for the 3 in-flight projects that had a material change to their project categorisation (i.e., 2 projects changed from P3 to Tier 1 and 1 project changed from P1 to Tier 2), and apply the new framework and templates accordingly.</p> <p>EY will include the completion of this partially addressed item in scope for subsequent reviews.</p>
<b>Outcome from Q6 Re-evaluation</b>	Fully Addressed
<b>Comment</b>	<p>This Recommendation is now fully addressed.</p> <p>As part of the original submission of Recommendation 3.2.1 in Q4, ASX's EPMO team conducted an independent review of all in-flight projects in September 2022 to determine a proposed tiering for each project so that they could transition onto the new Scaled PM Framework, governance and reporting. At that point in time (September 2022), ASX identified 3 projects out of the total in-flight portfolio which had a material change in their project categorisation rating:</p> <ul style="list-style-type: none"> <li>• Two projects changed from P3 to Tier 1 ( [redacted] and [redacted] )</li> <li>• One project changed from P1 to Tier 2 ( [redacted] )</li> </ul> <p>The list of projects with their proposed tiers would be validated and formally endorsed via the governance cycle i.e., PGG.</p>

	<p>However, by the time of the November 2022 PGG, the list of in-flight projects at ASX and projects which had material changes to their project categorisation rating changed. ASX stated that by the time of the November 2022 PGG, the [redacted] and [redacted] [redacted] projects had been put on hold and were under review due to various business decisions, so would not be required to transition to the new Scaled PM Framework.</p> <p>ASX presented an updated list of projects with their proposed tiers for endorsement at the November 2022 PGG. The list endorsed at the November 2022 PGG included the [redacted] project and [redacted] project, which had material changes to their project categorisation rating - [redacted] [redacted] had changed from P1 to Tier 2. We have reviewed the November 2022 PGG key notes and actions to confirm the endorsement of the project tiers.</p> <p>For the [redacted] project, we have reviewed the evidence provided by ASX to demonstrate that this project has transitioned to the new Scaled PM Framework, governance and reporting where applicable, including the below:</p> <ul style="list-style-type: none"> <li>• Weekly project status reporting</li> <li>• SGG established <ul style="list-style-type: none"> <li>◦ SGG ToR created with new template</li> <li>◦ Monthly SGG reporting</li> </ul> </li> <li>• Monthly PGG reporting</li> <li>• ERM Attestation from CRO that there is appropriate Line 2 expertise and availability to ensure the requisite level</li> </ul>
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of oversight, review and challenge until the completion of the project

- Project Deliverables RACI matrix

For the [REDACTED] project, ASX attested in their written response provided on 1 May 2023, that this project is now following the Scaled PM Framework as a Tier 2 project, and as a result, is no longer running an independent SGG (not required for Tier 2 projects). However, the project is now being governed as part of a new program, 'Current CHES Program', which has established a SGG at the program level.

In the written responses provided by ASX on 1 May 2023 and 3 May 2023, ASX included attestations from both the ASX General Manager of Enterprise Delivery and the ASX Head of EPMO that the transition to the new Scaled PM Framework has been completed for the inflight projects from the November 2022 PGG, including the [REDACTED] project.

Further, at EY's request, ASX sent through evidence on 5 May 2023 for the [REDACTED] project to show it is now following the new Scaled PM framework as a Tier 2 project.

For specific details relating to each Q4 Recommendation, please refer to the fourth IE quarterly report dated 11 November 2022.

## 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 two (2) recommendations submitted by ASX to ASIC and RBA on 14 April 2023 as part of the sixth quarterly review period.

The 'Executed, Appropriate and Sustainable' summary table contains the final outcome of our review of the ASX Actions including the supporting materials, and whether they have been completed appropriately by ASX to close the IBM Recommendation. The 'Findings' section offers the rationale for an Action's successful completion or, in the event of an Action's failure to be successfully passed, the 'Comment' section of the summary table provides clarification of the shortcomings that should be addressed.

## Summary of Review Recommendations Assessment

All two (2) Recommendations and the seven (7) related ASX Actions were fully addressed.

Below is a summarised view of the outcome of each Recommendation and its related ASX Action(s) submitted this quarter (March 2023). For detailed commentary around findings please refer to the following pages.

#	Recommendation / ASX Actions		Executed	Appropriate	Sustainable
6.1.3	<b>Implement a testing continuous improvement process</b>		<b>Recommendation has been addressed</b>		
	<b>Action 1</b>	Document and certify continuous improvement processes and metrics aligned to ISO29119 CMM level 4 and ASX Risk Appetite Statement	✓	✓	✓
	<b>Action 2</b>	Implement, monitor and report on continuous improvement program (at QE Authority)	✓	✓	✓
	<b>Action 3</b>	Establish roles and funding within QE for continuous improvement within the new practice model	✓	✓	✓
6.5.3	<b>Implement test coverage framework and metrics</b>		<b>Recommendation has been addressed</b>		
	<b>Action 1</b>	Design and document a test coverage tracking approach and associated processes	✓	✓	✓
	<b>Action 2</b>	Include traceability to requirements and identify other measures of test coverage, for example production data profile coverage, business scenario coverage, levels of test automation, exploratory test coverage, views of prior incidents	✓	✓	✓
	<b>Action 3</b>	Develop overall quality dashboard and analytics	✓	✓	✓
	<b>Action 4</b>	Implement test coverage tracking and integrate into QE processes and procedures and into reporting	✓	✓	✓

### Recommendation 6.1.3: Implement a testing continuous improvement process

	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

Design, document and implement a Continuous Test Process Improvement process.

#### ASX Action(s)

1. Document and certify continuous improvement processes and metrics aligned to ISO29119 CMM level 4 and ASX Risk Appetite Statement
2. Implement, monitor and report on continuous improvement program (at QE Authority)
3. Establish roles and funding within QE for continuous improvement within the new practice model

#### Findings

##### ASX Action 1:

ASX has created the 'QE Strategy - Continuous Improvement' page under the 'Quality Engineering and Testing Home' Confluence site. ASX states that the purpose of the 'QE Strategy - Continuous Improvement' page is to define and describe the QE&T Continuous Improvement approach, including its benefits, design and implementation, roles and responsibilities, and methodologies for sustainable continuous improvement of product quality and test process quality.

ASX also states on the page that the continuous improvement strategy defines "a mechanism for ongoing quantitative measurement and targets improvement of QE&T practices with the goal of achieving TMMi Maturity Level 4 and the ASX vision for Software Quality".

Under the 'Method' section, ASX notes that the QE&T goals include unified policies, processes, standard metrics & quality targets aligned with ISO29119 and targeting TMMi L4 maturity. TMMi L4 ('Level 4: Measured') builds on the previous TMMi levels (i.e., L1, L2, L3), and the core areas added are:

- [Redacted]
- [Redacted]
- [Redacted]

Within these three contexts, internal and external feedback loops need to be institutionalised to enable continuous improvement. ASX has created a table which outlines the goals, practices and sub-practices, as well as the ASX Approach to achieve the goal. Below is a summary of the goals and practices:

- **Goal: Align Test Management and Analysis Activities**  
**Practice:**
  - Establish test measurement objectives

- Specify test measures
- Specify analysis procedure
- **Goal: Provide Test Measurement Results**  
**Practice:**
  - Collect test measurement data
  - Analyse test measurement data
  - Communication results
  - Store data and results
- **Goal: Coordinate the Peer Review Approach with the Dynamic Test Approach**  
**Practice:**
  - Relate work products to items and features to be tested
  - Define a coordinated test approach
- **Goal: Measure Product Quality Early in the life-cycle by means of Peer Reviews**  
**Practice:**
  - Define peer review measurement guidelines
  - Define peer review criteria based on product quality goals
  - Measure work product quality using peer review
- **Goal: Adjust the Test Approach based on the Review Results Early in the life-cycle**  
**Practice:**
  - Analyse peer review results
  - Revise the product risk as appropriate
- **Goal: Measurable Project Goals for Product Quality and their Priorities are Established**  
**Practice:**
  - Identify product quality needs
  - Define the project's quantitative product quality goals

- Define the approach for measuring progress toward the project's product quality goals
- **Goal: Actual Progress towards Achieving the Project's Product Quality Goals is Quantified and Managed**  
**Practice:**
  - Measure product quality quantitatively throughout the life cycle
  - Analyse product quality measurements and compare them to the product's quantitative goals
- **Goal: ASX Risk Appetite Statement - QE & T Key Risk Indicators are established and monitored using a risk dashboard on a regular (at least monthly) basis**  
**Practice:**
  - Define and Document QE&T Key Risk Indicators
  - Monitor QE & T Key Risk Indicators using a risk dashboard monthly
- **Goal: ASX Risk Appetite Statement - Any issues triggered by the QE&T Key Risk Indicators are escalated**  
**Practice:**
  - Escalate issues triggered by the QE&T Key Risk Indicators

As part of Recommendation 6.3.3, submitted by ASX during the fifth quarterly review period in December 2022 (Q5), ASX created an overarching Test Methodology (inclusive of method, process and templates) aligned to ISO29119.

In the written response provided by ASX on 2 May 2023, ASX clarified that ASX has no current plan to externally certify that they are aligned to ISO29119 CMM Level 4/TMMi Level 4, but rather an internal certification. The internal certification demonstrating the alignment of processes and metrics to standards, desired maturity and risk appetite has been achieved through traceability of core process and metrics articulated in the QE&T repository to standards, maturity and risk elements.



During the January 2023 Quality Engineering and Testing Forum (QETF), ASX announced the inclusion of Key Risk Indicators (KRIs) in Defect Management Reporting as part of implementing Recommendation 6.1.3 (this recommendation) from 1 February 2023 onwards. At the time (January 2023), ASX stated they would be improving their Defect Management Measurement Plan to include QE&T KRIs, giving ASX ongoing monitoring of trends in QE&T KRIs and enabling early response if a QE&T KRI is approaching the threshold.

Each month, the QE Lead for Metrics and Reporting would use the existing process defined under 'KRI Reporting in ERICA' to record and report QE&T KRIs, which are measured and reported on a rolling quarterly basis. KRIs and thresholds are set via the ASX Risk Appetite Statement and the Enterprise Risk Management (ERM) Framework and are displayed in ERICA (ASX's risk management tool). Organisational level KRIs are agreed by business risk owners and management are expected to develop sensible KRIs and tolerances which support monitoring of control effectiveness and support assessment of their risk environment.

To provide ongoing monitoring of QE&T KRIs and to enable early response, a new metric 'Defect Risk Indicator RAG' will be added to the Defect Management Measurement Plan and monthly QETF Reporting. The RAG, trends in relevant details, and response recommendations would be included in the QETF Reporting Dashboard, QETF Pack, and prioritisation of the QE&T Continuous Improvement Backlog.

ASX has provided the QETF meeting packs for February 2023 and March 2023 and evidenced that the new metric 'Defect Risk Indicate RAG' has now been included in the monthly QETF reporting.

#### **ASX Action 2:**

As part of Recommendation 6.5.2 submitted by ASX during the September 2022 quarterly review period (Q4), ASX established the Quality Engineering & Testing Forum (QETF) in August 2022, to act as the QE Authority. The QETF occurs monthly and is held on the last Wednesday of each month. The QETF Terms of Reference states that the QETF is *"responsible and accountable for reviewing enterprise metrics*

*against established targets to identify risks and improvement opportunities"*.

Since the establishment of the QETF in August 2022, ASX has reported the following metrics monthly to the QETF:

- Risk Based Testing (RBT)
- Test Coverage
- Defect Management
- eQSI
- Testing Quality Index

These metrics are reviewed and any opportunities for improvement identified are discussed as well.

ASX introduced these metrics into the QETF reporting process and demonstrated the monitoring through the implementation of various IBM Recommendations over the several quarters, including:

- Recommendation 6.3.2 (Q3 & Q4) - Demonstrated monitoring and reporting of risk-based testing to QETF
- Recommendation 6.4.5 (Q5) - Demonstrated governance of testing where system integration and end to end testing is occurring to QETF
- Recommendation 6.4.8 (Q2 & Q4) - Demonstrated monitoring and reporting of independent specialist review to QETF
- Recommendation 6.5.1 (Q3 & Q5) - Demonstrated monitoring and reporting of defect leakage to QETF
- Recommendation 6.5.2 (Q4) - Demonstrated the introduction and monitoring and reporting of the quality metrics included in the quality metrics framework, and also set out the operating model, terms of reference and deliverables for the QETF

ASX has provided the QETF meeting packs for February 2023 and March 2023 and evidenced that the metrics have been reported and discussed during the QETF. QE&T Improvement has also been included as a

recurring topic for discussion in the monthly QETF, and ASX has reported on the achievements in this space.

### ASX Action 3:

ASX has recruited roles that focus on continuous improvement into its QE&T Capability practice (practice model) through the implementation of several IBM Recommendations over the course of several quarters.

Below is a summary of the recruited roles:

- Recommendation 6.3.2 (Q3) - recruited Quality Engineering/Test Lead for Methods, Processes and Procedures
- Recommendation 6.2.1 (upcoming Q7) - early recruitment for Q7. Recruited Quality Engineering/Test Lead for Method, Processes and Procedures in February 2023 (same job description as role recruited for 6.3.2)
- Recommendation 6.5.2 (Q3) - recruited Quality Engineering Lead for Metrics, Reporting and Assurance

ASX has confirmed that the roles remain filled and are enduring operational roles.

The job description for the Quality Engineering/Test Lead for Methods, Processes and Procedures, explicitly requires the role to:

- Identify, validate and promote opportunities for improvement related to the testing and quality processes and methods. Prioritise these opportunities and gain endorsement to introduce new and improved ways of working into the organisation
- Utilise their experience in the uplift and optimisation of testing and quality processes and methods to collaboratively identify relevant and tailored improvements that solve problems and take advantage of opportunities to tangibly mature testing and quality in the organisation
- Work with the Quality Engineering and Testing Capability Practice team to:

- contribute to developing and maturing the ASX quality engineering and testing policies, governance, assurance practices, and continuous improvement framework that set the direction, context and objectives for testing and quality engineering at ASX
- establish acceptable testing standards aligned to ASX risk appetite and requirements, and support an uplift program to align quality engineering and testing at ASX to internationally-accepted industry standards (ISO29119) at Capability Maturity Model (CMMi) Level 4 (or equivalent)

In the written response provided by ASX on 2 May 2023, ASX stated that Continuous Improvement is the very purpose and reason for the centralised function of the QE&T Capability Practice. Within the QE&T Strategy the roles and responsibilities of individual roles and the QETF are clearly outlined and directly demonstrate the responsibility of continuous improvement in their role responsibilities.

As a function, QE&T Capability Practice is funded as an operational run function and therefore included in annual planning. By funding the capability practice, continuous improvement is owned and actioned. ASX is investing across the board into its Centres of Excellence (CoE) structure - the QE&T Capability Practice is one of the CoE.

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

Please note, the below Communication Log also contains a consolidation of the past communications completed by ASX when the related Recommendation concept was first introduced.

Channel	Description	Date
Training Session Meeting	Q2 Recommendation 6.4.8 - Communication on important updates to the Project Management Framework (Independent Testing Assurance Training Material)	13/01/2022
Outlook Email	Q2 Recommendation 6.4.8 - Distribution of Independent Testing Assurance Training Material following training session	20/01/2022
Blog Post on Confluence	Q2 Recommendation 6.4.8 - Messaging and announcement to raise awareness and change of Independent Testing Assessment	24/01/2022
Outlook Email	Q2 Recommendation 6.4.8 - Communication from Head of Testing (Awareness for new projects - two new processes to independent testing assurance)	25/01/2022
Outlook Email	Q2 Recommendation 6.4.8 - Communication between Head of Testing and ERM (Awareness - new independent testing assurance process which will also cover customer testing)	27/01/2022
MS Teams Meeting	Q3 Recommendation 6.3.2 - 'Risk Based Testing Strategy -Fundamentals v1.0' training session	23/06/2022 and 24/06/2022
MS Teams Meeting	Q3 Recommendation 6.3.2 - Brown Bag Sessions - Delivery Excellence IBMR Information Session	27/06/2022-1/07/2022
MS Teams Meeting	Q3 Recommendation 6.5.1 - 'Defect Management Strategy -Fundamentals v1.0' training session. As part of submission for 6.3.1	23/06/2022 and 24/06/2022
MS Teams Meeting	Q3 Recommendation 6.5.1 - Brown Bag Sessions - Delivery Excellence IBMR	27/06/2022-1/07/2022

	Information Session. As part of submission for 6.3.1	
Meeting (In Person/Virtual)	Q4 Recommendation 6.5.2 - 'Quality Engineering & Testing Forum (QETF) Pre-Read Pack' session to introduce the new QETF	31/08/2022
Outlook Email	Q4 Recommendation 6.5.2 - Email from the Head of Testing - QE&T Capability Practice to ASX Testing and Project Management staff to raise awareness about the 'Quality Engineering and Testing - September Delivery Excellence Update'. Quality Metrics Framework Information Pack attached to the email.	6/10/2022
Meeting (In-Person)	Q5 Recommendation 6.4.5 - BA CoP Meeting	10/11/2022
Outlook Email	Q5 Recommendation 6.4.5 - Delivery Excellence - November Update Part 2 of 2. Email from Head of Testing announcing the new 'Knowledge Base - System Interfaces and Integration	18/11/2022
QETF Meeting	January 2023 QETF Meeting	31/01/2023
QETF Meeting	February 2023 QETF Meeting	28/02/2023
QETF Meeting	March 2023 QETF Meeting	28/03/2023

### Recommendation 6.5.3: Implement test coverage framework and metrics

	Executed	Appropriate	Sustainable
ASX Action 1	✓	✓	✓
ASX Action 2	✓	✓	✓
ASX Action 3	✓	✓	✓
ASX Action 4	✓	✓	✓
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

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.

#### ASX Action(s)

1. Design and document a test coverage tracking approach and associated processes
2. Include traceability to requirements and identify other measures of test coverage, for example production data profile coverage, business scenario coverage, levels of test automation, exploratory test coverage, views of prior incidents
3. Develop overall quality dashboard and analytics
4. Implement test coverage tracking and integrate into QE processes and procedures and into reporting

#### Findings

##### ASX Action 1:

ASX's test coverage tracking approach and associated processes have been developed progressively through the implementation of various Quality Engineering & Testing (QE&T) related IBM Recommendations over the course of several quarters, starting from the third quarterly review period in June 2022 (Q3).

During the third quarterly review period in June 2022, ASX submitted Recommendation 6.3.2 which introduced the concept of Risk Based Testing (RBT) and implemented the new QE strategy. The recommended method for performing an RBT assessment is through a collaborative workshop, hosted by the Test Manager and involving various SMEs relevant to the change. The purpose of the workshop is to complete the RBT assessment collaboratively and leveraging the experience knowledge of SMEs and, thereby, determine a proposed testing scope, test types, test pattern, and identify any residual risks.

As part of the new RBT approach, ASX is able to identify change characteristics (from the 'Change Characteristics Reference' section of the 'QE Strategy - Risk Based Testing' Confluence page) and associated risk profile to determine the appropriate test treatment to be applied (from the section titled 'Testing Treatment Library') in order to mitigate risk related to production leakage resulting from change. RBT assessment results must be recorded in the 'RBT assessment template' to ensure outcomes are presented in a consistent manner.

Please refer to the Q3 IE quarterly report '*ASX Independent Assessment of IBM Review Recommendations\_August 2022\_Final Report\_12082022*' for full details and findings for Recommendation 6.3.2.

During the fifth quarterly review period in December 2022 (Q5), under Recommendation 6.4.7, ASX created a 'Scenario Test Design Technique Guide' (i.e., test planning guide) page as part of their QE&T Confluence site. The purpose of the 'Scenario Test Design Technique Guide' is to provide guidance and criteria to plan for wider test coverage by utilising the Scenario Test Design Technique. This includes processes for planning and executing functional and non-functional (i.e., performance testing)

scenario tests, and how to derive test coverage. This guidance is provided to ensure test coverage achieves the level of coverage required based on the dimensions of the change to a system or systems.

ASX has developed the 'Template - Test Plan' template, which is used to capture the Scenario Test Design. The test plan captures inputs that supports defining the extent of testing to be performed in a project, and is a consolidation point for how testing will be performed factoring in scope and approach, objectives coverages, process, test data, measurement and environments. Once a test plan has been produced, the General Manager of Engineering and Architecture, as well as the Head of Testing must review and sign off on the test plan.

ASX's Test Plan template includes a section titled 'Test Coverage and Traceability'. ASX states that the 'Test Coverage and Traceability' section describes *'the test plan inputs (all information available to us at the time of test planning), the associated testing activities, test coverage, any reasons for test coverage gaps, and residual risks that are not mitigated by the planned testing activities.'* Once testing activities have been completed, a 'Test Summary Report' is produced - the 'Test Summary Report' also includes a section titled 'Test Coverage and Traceability'. ASX states that the 'Test Coverage and Traceability' section describes *'the level of test coverage for this change and identifies any reasons, actions or risks related to test coverage gaps. Test coverage is reported based on the number of tests that were executed fully as defined. The test representative for a given change is responsible for making a determination of whether testing has been completed "fully" and "as defined". The assessment of suitability of planned testing activities is based on various factors, including the QE&T Strategy, QE&T Policy, the results of the RBT, and the characteristics of the change etc.'*

Furthermore, during Q5, ASX created the 'Knowledge Base - System Interfaces & Integration' page under the 'Quality Engineering and Testing (QE&T) Home' page on the Confluence site, as part of Recommendation 6.4.5. The 'Purpose' section of the page states that the purpose of the 'System Interface Knowledgebase' is to provide a central repository of links to ASX system interfaces and integration. It is used by the QE&T team when performing test analysis and design to ensure coverage is

achieved and is used in addition to the interface/integration requirements captured on the project specific Confluence pages.

As described under the 'Method' section, QE&T teams needs to review enterprise interfaces to identify high risk/high importance interfaces that need to be considered as part of scope for System Integration/End to End Testing.

As part of Recommendation 6.3.3 also submitted by ASX during Q5, ASX created a 'Test Methodology' page as part of their Quality Engineering & Testing (QE&T) Confluence site. The 'Test Methodology' page describes the end-to-end process for delivering testing in a project at ASX, designed to be a constituent part of an overall Software Development Methodology. The 3 test methodologies used by ASX are:

- Waterfall
- Agile
- Hybrid

For each test methodology, ASX describes an overall delivery lifecycle, including the following factors where relevant:

- Key phases, stages or cycles
- Processes and activities that must be enacted
- Procedural rulesets, entry/exit criteria, checkpoints and gates
- Testing artefacts including their relationship internal to testing and to development touchpoints
- Required delivery unit composition (e.g., team structures)
- Roles and responsibilities
- The means by which governance is performed

Please refer to the Q5 IE quarterly report '*ASX Independent Assessment of IBM Review Recommendations\_February 2023\_Final Report\_10022023*' for full details and findings for Recommendations 6.3.3, 6.4.5 and 6.4.7.

## ASX Action 2:

As stated in the findings for ASX Action 1, the ASX Test Plan template and the Test Summary Report template both have a section dedicated to 'Test Coverage and Traceability'. Under this section in the Test Plan template, traceability between the planned testing activities and the following categories of test plan inputs is required to be documented:

- Functional Requirements
- Non-Functional Requirements
- Systems or System Components
- System Integrations
- Relevant Business Scenarios
- Process Flows
- End-to-End Flows
- Affected User Groups

Details captured around planned testing activities are:

- List of Test Plan Inputs
- Number of Test Plan Inputs
- Associated Testing Activities
  - Which testing activities will demonstrate that these test plan inputs are satisfied?
- Number of Test Plan Inputs fully covered by testing activities and defined in the QE&T Minimum Standards and the RBT Assessment
- Reasons, Actions or Risks
  - Are all test plan inputs are fully covered by testing activities
  - Test plan inputs not fully covered by testing activities - reasons and related actions to be provided, and/or risks raised

Similarly for the Test Summary Report template, the 'Test Coverage and Traceability' section documents and reports on traceability and test

execution coverage between the same categories of testable inputs and executed tests between planned tests and executed tests.

As part of past IBM Recommendation submissions, (i.e., Recommendation 6.4.7 from Q5), ASX stated that it is a mandatory requirement for all projects/changes to create a 'Requirements Traceability Matrix (RTM)' document, a document that maps and traces requirements through design and completes with the relevant test cases, as part of their deliverables. The main purpose of the RTM is to track all the requirements and to confirm that the project implementation meets the scope/objectives. The RTM is generally completed using Confluence and Jira. In the instance where Jira isn't used, a 'Traceability Matrix' spreadsheet document is used.

The RBT Assessment Template also includes under section '8. Test Treatment and Scope Attestation' a checklist to ensure information that gives context to the decision making surrounding nominated test treatments and any variances are included. [REDACTED]

Additionally, ASX has created the 'Measurement Plan - Test Coverage' to define the quantifiable metrics which should be captured to determine whether desired testing results have been achieved. Each of the metrics have a definition and method for calculation, a minimum, maximum and target value, as well as guidance on interpreting the values ('Interpretation and Response Recommendations').

The 'Measurement Plan - Test Coverage' covers the following:

- Quality Objective
- Relevant, Measurable Outcomes
- Measurement and Metrics Definition
- Operational Definition (including Operational Process)
- Implementation Plan

The metrics included in the 'Measurement Plan - Test Coverage' include:

- Planned Tests
- Executed Tests
- Test Plan Execution Coverage
- Enterprise Test Plan Execution Coverage
- Test Plan Inputs
- Planned Test Coverage
- Defect Count
- Testing Issue Defects
- Testable Inputs
- Test Requirements Execution Coverage
- Enterprise Test Requirements Execution Coverage
- Testing Gap Defect Leakage

ASX notes in the Summary Consolidation Page that the Test Coverage Measurement Plan informs the Test Plan and Test Summary Report on the approach to reporting metrics and measure in planning and execution of testing activities.

#### **ASX Action 3:**

During the fourth quarterly review period in September 2022 (Q4), ASX submitted Recommendation 6.5.2 which established the Quality Engineering & Testing Forum (QETF) in August 2022 to act as the QE Authority. The QETF occurs monthly and is held on the last Wednesday of each month.

ASX's QE Lead for Metrics and Reporting collects and records the raw data, calculated values, and metrics related to reporting on the various measurement plans monthly to the QETF, including:

- Risk Based Testing
- Test Coverage
- Defect Management
- eQSi
- Independent Testing Assessment

- Testing Quality Index

After the information is collected, it is reported at the monthly QETF in the form of a dashboard. ASX has provided the 'QETF Monthly Metrics Reporting' for January 2023 to March 2023, as well as the QETF meeting packs for the January 2023 to March 2023 to demonstrate that the RBT and Test Coverage metrics have been properly reported.

#### **ASX Action 4:**

As stated in ASX Action 1, ASX's test coverage tracking approach and associated processes have been developed progressively through the implementation of various Quality Engineering & Testing (QE&T) related IBM Recommendations over the course of several quarters, starting from the third quarterly review period in June 2022 (Q3), including:

- Recommendation 6.3.2 (Q3) - Risk Based Testing Strategy
- Recommendation 6.3.3 (Q5) - ASX Testing Methodology
- Recommendation 6.4.5 (Q5) - System Interfaces & Integration Log
- Recommendation 6.4.7 (Q5) - ASX Test Planning Guide

The processes have been documented accordingly in the relevant pages of the QE&T Confluence site.

Additionally, ASX created the awareness and communication packs below for Testing Community/practitioners and General Managers to raise awareness on why ASX measures test coverage and what the test coverage measures are:

- Test Coverage Framework and Measurement Plan (November 2022)
- Implementing Test Coverage Framework and Metrics (November 2022).

These were distributed via email by the Head of QE&T as part of the November 2022 Delivery Excellence update.

As stated in ASX Action 3, ASX has been reporting RBT and Test Coverage metrics to the QETF on a monthly basis.

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

Please note, the below Communication Log also contains a consolidation of the past communications completed by ASX when the related Recommendation concept was first introduced.

Channel	Description	Date
MS Teams Meeting	Q3 Recommendation 6.3.2 - 'Risk Based Testing Strategy -Fundamentals v1.0' training session	23/06/2022 and 24/06/2022
MS Teams Meeting	Q3 Recommendation 6.3.2 - Brown Bag Sessions - Delivery Excellence IBMR Information Session	27/06/2022-1/07/2022
Meeting (In Person/Virtual)	Q4 Recommendation 6.5.2 - 'Quality Engineering & Testing Forum (QETF) Pre-Read Pack' session to introduce the new QETF	31/08/2022
Outlook Email	Q4 Recommendation 6.5.2 - Email from the Head of Testing - QE&T Capability Practice to ASX Testing and Project Management staff to raise awareness about the 'Quality Engineering and Testing - September Delivery Excellence Update'. Quality Metrics Framework Information Pack attached to the email.	6/10/2022
Meeting (In-Person)	Q5 Recommendation 6.4.5 - BA CoP Meeting	10/11/2022
Outlook Email	Q5 Recommendation 6.4.5 - Delivery Excellence - November Update Part 2 of 2. Email from Head of Testing announcing the new 'Knowledge Base - System Interfaces and Integration	18/11/2022
MS Teams Meeting	Q5 Recommendation 6.4.7 - QET Lighthouse Review Forum - Scenario Based Testing Guideline walkthrough	14/10/2022
Outlook Email	Q5 Recommendation 6.4.7 - Provides overview of updates made to Scenario Based Testing Guideline, post 'QET Lighthouse Review Forum - Scenario Based Testing Guideline walkthrough' meeting	19/10/2022

Outlook Email	Q5 Recommendation 6.4.7 - Quality Engineering and Testing - October Delivery Excellence Update. Launch of Scenario Based Testing.	7/11/2022
Outlook Email	'Delivery Excellence - November update The final part'. Email from Head of QE&T providing update on new templates to use.	25/11/2022
Outlook Email	Info pack regarding 'Test Coverage Framework and Measurement Plan - November 2022'. Included as part of the Delivery Excellence November 2022 update from Head of QE&T	25/11/2022
Outlook Email	Info pack regarding 'Implementing Test Coverage Framework and Metrics - Delivery Excellence IBMR December 2022'. Included as part of the Delivery Excellence November 2022 update from Head of QE&T	25/11/2022
QETF Meeting	Offline (email distribution) December 2022 QETF Meeting	16/12/2022
QETF Meeting	January 2023 QETF Meeting	31/01/2023
QETF Meeting	February 2023 QETF Meeting	28/02/2023
QETF Meeting	March 2023 QETF Meeting	28/03/2023



## Appendix A Recommendation review workshops list

#	Date	Meeting Title
1	<i>Workshop not held, written response requested</i>	[Cancelled] Q6 ASX Remedial Actions - Q&A Review for Recommendations 6.1.3 and 6.5.3
2	9/05/2023	Q6 ASX IBM Recommendations: EY IE Draft Report Factual Accuracy Check Review

# Appendix B Interviewed ASX stakeholders list



# 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 fifty-six (56) Recommendations for closure to date. All fifty-six (56) Recommendations have been deemed 'fully addressed' and closed.

The Design Adequacy Report submitted on 27 April 2022 identified that 13 Recommendations out of the remaining 37 Recommendations which had yet to be submitted at that point in time, 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 Independent Expert Recommendations for those partially addressed Recommendations in the Design Adequacy Report.

Below is an overview of each of the 59 Recommendations and their closure / submission status at the end of the sixth quarterly review period (12 May 2023):

Status	Description	Total (59)
✔ Closed	Recommendation reviewed by the IE and deemed fully addressed	56
✔ Partially Addressed	Recommendation submitted by ASX, reviewed by the IE but currently deemed partially addressed	0
Not Submitted	Recommendations not yet submitted by ASX (expected due date indicated)	3
✘ Original Submission Date	Indicates the original date Recommendation was submitted by ASX but deemed partially addressed by IE after review. <i>*Applicable for Recommendations deemed fully addressed in subsequent quarterly review periods.</i>	

#	IBMR	Design Adequacy - Fit for Purpose?	Status	Q1	Q2	Q3	Q4	Q5	Q6 (Current)	Q7
<b>1. Risk Related Recommendations</b>										
1	1.1.1	Partial	Closed			✔				
2	1.2.1	N/A	Closed	✘		✔				
3	1.2.2	Yes	Closed			✔				
4	1.2.3	Yes	Closed			✔				
5	1.2.4	N/A	Closed	✔						
6	1.2.5	Partial	Closed			✔				
7	1.2.6	Yes	Closed		✘	✔				
8	1.3.1	N/A	Closed	✔						
9	1.3.2	N/A	Closed	✔						



#	IBMR	Design Adequacy - Fit for Purpose?	Status	Q1	Q2	Q3	Q4	Q5	Q6 (Current)	Q7
10	1.3.3	N/A	Closed	✓						
11	1.3.4	Yes	Closed				✓		✓	
12	1.3.5	N/A	Closed	✓						
13	1.3.6	Partial	Closed		✗	✓				
14	1.3.7	Partial	Closed			✓				
15	1.3.9	N/A	Closed	✓						
16	1.3.10	N/A	Closed	✓						
17	1.4.1	Yes	Closed			✓		✓		
<b>2. Governance Related Recommendations</b>										
18	2.1.1	N/A	Closed	✓						
19	2.1.2	N/A	Closed	✓						
20	2.1.3	N/A	Closed	✓						
21	2.1.4	N/A	Closed	✓						
<b>3. Delivery Related Recommendations</b>										
22	3.1.1	Yes	Closed			✓		✓		
23	3.1.2	N/A	Closed	✓						
24	3.1.3	N/A	Closed	✓						
25	3.1.4	N/A	Closed	✓						
26	3.2.1	Yes	Closed				✓		✓	
27	3.2.2	Partial	Closed			✓		✓		
28	3.2.3	Yes	Closed			✓		✓		
29	3.2.4	N/A	Closed	✓						
30	3.2.5	Yes	Closed			✓		✓		
31	3.2.6	N/A	Closed	✓						
32	3.2.7	N/A	Closed	✓						
<b>4. Requirements Related Recommendations</b>										
33	4.1.1	N/A	Closed	✓						

#	IBMR	Design Adequacy - Fit for Purpose?	Status	Q1	Q2	Q3	Q4	Q5	Q6 (Current)	Q7
<b>5. Vendor Management Related Recommendations</b>										
34	5.1.1	N/A	Closed	✘		✓				
35	5.1.2	N/A	Closed	✘		✓				
36	5.1.3	Yes	Closed		✓					
<b>6. Testing Related Recommendations</b>										
37	6.1.1	Yes	Closed				✓			
38	6.1.2	Yes	Closed					✓		
39	6.1.3	Yes	Closed						✓	
40	6.2.1	Yes	Not Submitted							
41	6.2.2	Yes	Closed		✓					
42	6.3.1	Partial	Closed					✓		
43	6.3.2	Yes	Closed			✓	✓			
44	6.3.3	Yes	Closed					✓		
45	6.4.1	Partial	Closed		✓					
46	6.4.2	Yes	Not Submitted							
47	6.4.3	Partial	Closed				✓			
48	6.4.4	Yes	Closed		✓					
49	6.4.5	Partial	Closed					✓		
50	6.4.6	Yes	Not Submitted							
51	6.4.7	Yes	Closed					✓		
52	6.4.8	Yes	Closed		✓		✓			
53	6.5.1	Partial	Closed			✓		✓		
54	6.5.2	Yes	Closed				✓			
55	6.5.3	Partial	Closed						✓	
56	6.5.4	Yes	Closed				✓			
57	6.6.1	N/A	Closed	✘		✓				
58	6.7.1	Partial	Closed		✓					

#	IBMR	Design Adequacy - Fit for Purpose?	Status	Q1	Q2	Q3	Q4	Q5	Q6 (Current)	Q7
<b>7. Incident Management Related Recommendations</b>										
59	7.1.1	Partial	Closed		✓					

For specific details relating to each Recommendation, please refer to the relevant IE quarterly review report for the period the Recommendation was originally submitted:

- First IE quarterly report dated 25 February 2022
- Second IE quarterly report dated 13 May 2022
- Third IE quarterly report dated 12 August 2022
- Fourth IE quarterly report dated 11 November 2022
- Fifth IE quarterly report dated 10 February 2023

## Appendix F Summary of Closed Partially Addressed Recommendations and ASX Actions from previous quarterly review periods

Below is a summary of when partially addressed or not addressed Recommendations and ASX actions from previous quarterly review periods were closed following re-submission by ASX and re-evaluation by the IE.

### Q1 January 2022

In the first quarterly report submitted by ASX on 28 January 2022, we identified four (4) out of the twenty-two (22) submitted Recommendations as needing further evidence in future quarters for re-evaluation: 1.2.1, 5.1.1, 5.1.2 and 6.6.1.

ASX submitted all four (4) Partially Addressed Recommendations for re-evaluation in Q3 and these Recommendations have all been assessed by EY as fully addressed.

Please refer to our third IE quarterly report dated 12 August 2022 for outcome details and commentary.

### Q2 March 2022

In the second quarterly report submitted by ASX on 13 April 2022, we identified three (3) out of the nine (9) submitted Recommendations as needing further evidence in future quarters for re-evaluation: 1.2.6, 1.3.6 and 6.4.8.

ASX submitted two (2) of the three (3) Partially Addressed Recommendations (1.2.6 and 1.3.6) in Q3 and one (1) Recommendation (6.4.8) in Q4 for re-evaluation, and these Recommendations have all been assessed by EY as fully addressed.

Please refer to our third IE quarterly report dated 12 August 2022 and fourth IE quarterly report dated 11 November 2022 for outcome details and commentary.

### Q3 June 2022

In the third quarterly report submitted by ASX on 14 July 2022, we identified seven (7) out of the twelve (12) submitted Recommendations as needing further evidence in future quarters for re-evaluation: 1.4.1, 3.1.1, 3.2.2, 3.2.3, 3.2.5, 6.3.2 and 6.5.1.

ASX submitted one (1) of the seven (7) Partially Addressed Recommendations (6.3.2) in Q4 and six (6) Recommendations (1.4.1, 3.1.1, 3.2.2, 3.2.3, 3.2.5 and 6.5.1) in Q5 for re-evaluation, and these Recommendations have all been assessed by EY as fully addressed.

Please refer to our fourth IE quarterly report dated 11 November 2022 and fifth IE quarterly report dated 10 February 2023 for outcome details and commentary.

## Appendix G Summary of Closed Design Adequacy Report IE Recommendations

In April 2022, EY produced a report (“Design Adequacy Report”) assessing the design adequacy of the ASX Response Plan to address the IBM Recommendations.

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’.

ASX submitted responses for all four (4) IE Recommendations in June 2022 (Q3) for assessment and three (3) IE Recommendations were assessed as fully addressed. Please refer to the third IE quarterly review report dated 12 August 2022 for outcome details and commentary.

The remaining IE Recommendation relating to ‘Program governance and management - Change Management Strategy’ was deemed partially addressed in Q3. ASX re-submitted the final IE Recommendation for evaluation in Q5 and it was assessed as fully addressed. Please refer to the fifth IE quarterly review report dated 10 February 2023 for outcome details and commentary.

Please refer to the Design Adequacy Report dated 27 April 2022 to read our detailed findings and commentary.

## Appendix H 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 12 May 2023 ("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.

1. Subject to the provisions of this notice, the Report has been prepared for ASX and ASX's regulators ASIC and the RBA, and may not be disclosed to any other party or used by any other party or relied upon by any other party without the prior written consent of EY.
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.

4. No reliance may be placed upon the Report or any of its contents by any party other than ASX and ASX's regulators ASIC and the RBA. Any party receiving a copy of the Report must make and rely on their own enquiries in relation to the issues to which the Report relates, the contents of the Report and all matters arising from or relating to or in any way connected with the Report or its contents.
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8. EY disclaims all liability, and takes no responsibility, for any document issued by any other party in connection with the Project.
9. A recipient must not name EY in any report or document which will be publicly available or lodged or filed with any regulator without

EY's prior written consent, which may be granted at EY's absolute discretion.

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