

Internet of Things Advisory Board (IoTAB) Committee

Established by 9204(b)(5) of the William M. (Mac) Thornberry
National Defense Authorization Act for Fiscal Year 2021 ([Pub. L. 116-283](#))

June 14, 2024

Virtual Meeting Platform: Webex

MEETING MINUTES

<u>Board Members</u>	<u>Board Chairs and NIST Staff</u>
<ul style="list-style-type: none">● Michael J. Bergman, Consumer Technology Association● Dr. Ranveer Chandra, Microsoft● Nicole Coughlin, Town of Cary North Carolina● Nicholas Emanuel, CropX● Steven E. Griffith, National Electrical Manufacturers Association● Tom Katsioulas, Global Semiconductor Alliance● Ann Mehra● Robby Moss, Moviynt● Maria Rerecich, Consumer Reports● Debbie A. Reynolds, Debbie Reynolds Consulting● Dr. Arman Shehabi, Lawrence Berkeley National Laboratory● Peter Tseronis, Dots and Bridges LLC	<ul style="list-style-type: none">● Benson M. Chan, Strategy of Things Inc. (Chair)● Daniel W. Caprio Jr., The Providence Group (Vice Chair)● Barbara Cuthill, NIST (Designated Federal Officer)● Jeffrey Brewer, NIST (Alternate Designated Federal Officer)● Katerina Megas, NIST (Federal Working Group Co-Convener)● Alison Kahn, NIST (Federal Working Group Co-Convener)● Greg Witte, NIST Contractor, (Report Editor)● Brad Hoehn, NIST Contractor (Report Editor)● David Lemire, NIST Contractor (Scribe)
<u>Board Members Absent:</u> <ul style="list-style-type: none">● Prof. Kevin T. Kornegay, Morgan State University● Debra Lam, Georgia Institute of Technology	

Action Items Over Both Days

*Note: Names and roles are **bolded** to show ownership.*

Following the meeting:

Board Members to provide specific revision and writing:

Editors to:

Timeline/Graphics Support:

IoTAB Meeting on Friday, June 14, 2024

Ms. Cuthill opened the meeting and thanked the board members for their hard work over the last year and a half.

Note that the reference report version for the meeting was the [13 June 2024 version](#) on the NIST website, which contained updates based on board member feedback to the 4 June version.

Ms. Cuthill turned the meeting over to Mr. Chan.

Chair's Opening Remarks

Mr. Chan, Mr. Caprio

Document: [Chair's Slides](#)

- Mr. Chan reviewed the expected outcomes for the meeting.
 - Agree on a baseline understanding of the current state of the latest overall report draft
 - Approve or reject content that was missing from the May 2024 (meeting 13) report.
 - Develop understanding of current report gaps
 - Develop understanding of the process to finish the report
 - Develop understanding and expectation for next steps.
- Mr. Chan stated he felt the report has gotten much better and thanked the members for the reviews and contributions of a lot of meaningful content. He noted that the missing content referenced by Mr. Katsioulas at the May 2024 meeting had been restored and would be reviewed. Finally, Mr. Chan discussed the need to understand the process to finish the report and any next steps.
- Mr. Caprio described the report as “close”, noting the potential to still sharpen the findings.
- Mr. Chan reviewed the meeting agenda:
 - Review changes to the report.
 - Discuss edits and finalization instructions for the editors, including a presentation by Mr. Katsioulas
 - Vote to accept the report and approve the finalization instructions for the editors
 - Discuss report distribution
- Mr. Chan described his remaining concerns regarding the report as focused on telling the overall story more effectively and in a way that is easy for readers to consume, highlighting the most important matters and presenting them with the appropriate “tone”, and making it more actionable. He also described making the report “consumable” as a key consideration.

Review Changes to the IoT Advisory Board Report

Mr. Witte

Document: [13 June 2024 IoT Advisory Board Report](#) (in-process pre-read draft)

- Mr. Witte added his thanks to the board members for their contributions and feedback. He said he would point a last-minute change to one recommendation, and that he would accept live edits during the meeting.

Executive Summary

- Mr. Witte described the revised Executive Summary as more high-level and said it highlighted certain key recommendations. He invited board member input during the meeting to ensure the correct priorities are emphasized.

Introduction

- Mr. Witte said the introduction focused on how the board viewed IoT, without trying to create a definition, and that it includes industrial, healthcare, and other (non-consumer) IoT applications. He noted points where graphics would be added.
 - Mr. Bergman and Mr. Katsioulas negotiated improved wording to address Mr. Katsioulas' concern that the description of IoT sounded too consumer-oriented and Mr. Bergman's concern that the connected device is an essential aspect of IoT.
 - Mr. Katsioulas and Mr. Chan discussed alternative approaches to presenting the U.S. aspect of global IoT trends, with Mr. Katsioulas advocating describing a goal for U.S. participation in the global IoT market. Mr. Chan pointed out that the IoT trends varied considerably in different regions. Mr. Chan offered to provide additional information from his company's research.

Findings

- Mr. Witte moved on to the findings, saying there are 26 total findings (18 general and 7 industry-specific). He walked through the high-level finding statements and noted that many of the supporting discussions had been clarified through board member inputs.
 - Mr. Chan noted that the findings had been reorganized to cluster related findings and solicited board member suggestions for any improvements to the organization.
 - Mr. Katsioulas suggested moving finding 9 (related to Chinese-sourced IoT modules) before finding 5 (vulnerabilities in chips supply chains). Mr. Witte deferred any reordering pending other board member inputs.
 - Mr. Witte noted input from Ms. Reynolds regarding the importance of privacy (finding 7) and an associated placeholder for a graphic illustrating 16 states with disparate privacy legislation and indicating the breadth of the challenge of reconciling those disparities.
 - Mr. Chan noted that finding 20 (smart communities) combined two sets of content, resulting in a long finding that might need to be split. Mr. Griffith pointed out content under finding 20 (e.g., smart streetlights, intelligent traffic systems) that would fit better under finding 21 (smart transportation). No board members spoke in favor of splitting finding 20.
 - Mr. Griffith suggested edits to condense both the finding statement and the supporting text for finding 21. He noted that the number of examples supporting this finding could be reduced, suggesting that two or three examples would suffice.
 - Mr. Katsioulas described finding 22 (healthcare) as "convoluted and hard to follow".
 - Mr. Katsioulas expressed concerns that input from Mr. Tseronis on critical infrastructure was missing, and that confidentiality had not been addressed equivalent to privacy.
 - Mr. Tseronis noted the large volume of recent relevant government statements and offered to work with the editors to capture that material.
 - Mr. Bergman expressed concern about the level of discussion regarding new material being contrary to the goal of approving the report. He reminded the board members that new content required public review and approval.

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- Mr. Witte showed an example summary paragraph that Mr. Katsioulas had provided for finding 5 with pointers to the related requirements, providing more context than the bare list of requirements right after the finding.
 - Mr. Bergman asked if such paragraphs would be available during the meeting.
 - Mr. Witte suggested that board members could each propose a few sentences to related finding they are associated with to the related recommendations.
 - Mr. Katsioulas emphasized this material would just be a summary of the finding and links to the recommendations.
 - Mr. Witte suggested the editors could draft this material, but he believed the board members would provide better summaries. He said an alternative is a table with a list of the recommendations but that he felt the text summary was more effective.
 - Mr. Chan suggested the table would be a useful “bird’s eye view”.
 - Mr. Witte acknowledged the value of providing both.

Recommendations

- Mr. Witte moved on to review the recommendations. He explained the recommendations had been refined with some clarifying text and that Mr. Chan had proposed some reorganization. He also noted that the editorial team would document the findings and recommendations associations in both directions.
 - Mr. Katsioulas expressed concern that the quantum computing recommendation doesn’t belong in national strategy. He also considered it important to finalize the numbering to develop the finding-to-recommendation linkage summary paragraphs described previously.
- Mr. Chan explained there were suggested moves for recommendations both within and across themes. He pointed to the quantum computing recommendation Mr. Katsioulas had mentioned as a candidate to move from the National IoT Strategy theme to the Trust theme.
 - Mr. Katsioulas suggested evaluating possible moves in the context of a spreadsheet that he had developed.
 - Mr. Chan noted that Mr. Katsioulas approach was also looking at the balance of content across themes.
- Mr. Witte displayed the full markup so that members could clearly see the changes to the recommendations, including the addition of an initial noun (e.g., “Congress should ...”) as described by Mr. Caprio. Mr. Witte asked the board if there were objections to adding the initial noun back to each of the recommendations (e.g., “The Executive Branch should ...”), adding that he hadn’t heard any disagreement with that approach. He noted that this change in wording was a shift back to a style used in earlier drafts of the report.
 - Mr. Katsioulas advocated to keep the recommendation text shorter and place the specifics of who should implement it in the first paragraph of supporting text.
 - Mr. Chan countered that there is no guarantee a reader would read more than just the recommendation text. He said he felt naming a specific audience in the recommendation sends a clearer, more powerful message.
 - Mr. Witte added that Mr. Caprio felt very strongly about this change. He clarified the rationale for the choice of nouns, saying that recommendations that involved legislative matters such as funding and authorities were directed to Congress, whereas recommendations related to policy and other matters that can be accomplished within existing authorities were directed to the Executive branch.
 - Mr. Bergman and Ms. Rerecich agreed that the target audience for the report would be aware.

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- Ms. Cuthill noted that the IoTFWG members will have a clear view of which recommendations fall within existing authorities.
 - Mr. Witte concluded that his goal was to ensure the board members were aware since this change had affected every recommendation.
 - Mr. Witte returned to the recommendations review, noting that numerous placeholders had been filled in with contributed content. He reported he still needed to fill in supporting text under a handful of key recommendations that are summary recommendations that set up a group of enabling recommendation, saying that would be completed in the next few days. He acknowledged that some of these “key” recommendations were more of a tool for organizing a group of related enabling recommendations and noted the need to agree during the meeting on how to handle those KRs.
 - Mr. Witte displayed KR5.1 as an example of a “small recommendation” regarding new financial models with more substance provided in the enabling recommendations.
 - Ms. Cuthill emphasized the KRs are an organizing mechanism and there was no effort being made to look for new substantive content. She asked if any board members considered developing a summary paragraph under a KR with no new information to be a substantive change.
 - Mr. Bergman stated that approach was acceptable since board members would have the opportunity to object that something presented as an editorial change was actually substantive. He asked that any proposed changes be clearly identified as editorial, after any changes deemed substantive were presented to the board during this meeting.
 - Ms. Cuthill concurred, saying that any substantive changes would be part of the vote at this meeting and the finalization instructions would be limited to editorial changes. She said any substantive changes proposed today should be “very targeted”.
 - Mr. Bergman confirmed that this meant the text for any substantive changes would be seen by the board during the meeting.
 - Mr. Witte noted that the sole exception was the report’s conclusion, which remains to be written and will likely come from the chairs. He said this would essentially be a summary and would not be substantive.
 - Mr. Chan added that the summary could include material to direct the IoTFWG’s attention to topics the IoTAB had not been able to address.

Recommendation Reorganization

Document: [IoT Recommendations Spreadsheet](#)

- Mr. Chan discussed his spreadsheet that provides the background regarding reorganizing of requirements. He explained there is a tab per theme with columns for key recommendations, enabling recommendations, and Mr. Chan’s comment about changes. He acknowledged that the findings and recommendations had been approved at the May meeting and explained that he and Mr. Caprio felt that changing recommendation locations without changes in their content was an editorial change.
 - Mr. Witte walked through the shifts of recommendation locations under Theme 1.
 - Mr. Katsioulas identified two recommendation relocations he considered important:
 - quantum computing shouldn’t be under the national strategy (he suggested modernizing infrastructure or cybersecurity as alternative locations); and
 - digital twins should be under trust not modernization.
- Mr. Witte and Ms. Cuthill asked if the board members viewed reorganizing recommendations within a theme as a substantive change.
 - Several members concurred that it was editorial. No member considered it substantive.

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- Mr. Witte extended the question to address moves between themes, such as relocating the quantum computing recommendation as proposed by Mr. Katsioulas.
 - Ms. Cuthill stated that substantive changes could be made at the meeting through a vote or a call for objections. She noted that there are only two proposed relocations across themes, and the board could agree on destination themes for those recommendations at this meeting, whether or not that change was substantive.
 - Several members stated that moving recommendations across was editorial, and no member considered it substantive.
 - Mr. Katsioulas proposed that ER1.1.3, regarding quantum computing, be moved to the Trust theme, ideally located close to recommendations regarding AI.
 - Mr. Caprio supported leaving ER1.1.3 in place. He stated that the national strategy theme is the most “big picture” part of the report and that technologies such as quantum computing and AI are becoming more interrelated in “the public consciousness”.
 - Mr. Katsioulas responded that if ER1.1.3 remains in place, content regarding AI should be added, however his view was that since these are also topics related to the Critical and Emerging Technologies (CET) list, moving ER1.1.3 to trust makes more sense.
 - Mr. Bergman supported moving ER1.1.3 under trust, saying it has a natural fit there and is too small in scope for a national IoT strategy. He noted that the inability of IoT devices to support post-quantum cryptographic algorithms (PQC) is another point in favor of relocating.
 - Mr. Chan expressed his inclination to move ER1.1.3.
 - Mr. Caprio acknowledged the consensus was to move ER1.1.3.
 - Mr. Witte displayed the other candidate for relocation: ER2.4.3, regarding digital twins and digital threads, which Mr. Katsioulas had proposed moving from modernization to trust. No discussion was found to be necessary on this move.

Post-Meeting Review Process

- Ms. Cuthill clarified that any substantive changes, such as new findings, would require formal approval of specific wording. She said that non-substantive matters, such as adding a reference, could be dealt with separately and that her expectation was there would be instructions to the editors on such editorial changes, including rearranging content, captured by the end of the meeting. She said the report would be sent to the entire board after that editing pass to confirm that it conformed to the instructions and did not incorporate substantive changes. She agreed that adding a new finding would be substantive and would require having the wording at this meeting.
- Mr. Katsioulas expressed concern that the entire board had not reviewed the report.
 - Ms. Cuthill responded that the entire board had been provided the opportunity to review the June 4 version to the extent they desired.
 - Mr. Witte added that there will be time for one more round of review to finalize the report without making any further substantive changes.
 - Mr. Chan offered approaches to deal with items the board feels are missing:
 - Develop the material and approve it during the current meeting
 - Enhance the supporting text of an existing finding
 - Add the item to the report’s conclusion to bring it to the IoTFWG’s attention.
 - Mr. Katsioulas stated that adding content regarding critical infrastructure concerns to other findings was acceptable but emphasized his view that it is an important national security matter more important than personal privacy.

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- Mr. Bergman noted that the board members also have options other than the report to put forth their opinions regarding IoT-related matters.

Discussion Prior to Accepting the Findings

- Mr. Witte summarized the changes to the findings:
 - Major updates to the quantum finding (finding 10), adding significant detail
 - Clarification of the two small business findings to distinguish the goals of
 - assisting adoption of IoT by small business (finding 17) and
 - addressing barriers to the marketing and adoption of IoT innovations developed by small businesses (finding 18)
 - Creating a separate privacy finding (finding 7) distinct from the cybersecurity finding (finding 8)
 - Refining the AI finding (finding 13) to reduce its length and enhance its clarity
 - Business ecosystems moved from introduction to findings (finding 14)
 - Added a finding regarding IoT in the industrial sector (finding 26)
 - Added a finding regarding end-to-end supply chain visibility (finding 25)
 - Reduced duplication of content between the introduction and the findings.
- Mr. Caprio stated that while reading the latest report draft it seemed there were a lot of new findings, and he found it hard to differentiate what was new. Mr. Caprio also described a strong emphasis on supply chain and CHIPS that he felt was not reflective of the board's efforts.
 - Mr. Katsioulas responded that this was related to material that was dropped between the April and May drafts, had been restored, and subsequently reduced by about half. He reminded Mr. Caprio that some of that content dated from a year ago.
 - Mr. Witte added that he had request assistance from Mr. Chan and Mr. Katsioulas to confirm there wasn't other content missing, and that only three findings were added since the May version.
- Mr. Bergman expressed concerns regarding the new introductory paragraph under finding 10 (quantum). He offered to provide replacement text that will convey the same message about the power of quantum computing.
- Mr. Witte noted that there is a lot of new text that needs to be refined quickly and requested prompt input of feedback, corrections, or additions. He stated one of his next activities will be proofreading of the report's content and addressing details such as figure captions.
- Mr. Caprio indicated he was still concerned about his sense of heavier supply chain emphasis ("more column inches") in the latest report draft, disproportionate to the actual meetings.
 - Mr. Katsioulas provided his analytic results about the page counts of findings to clarify that those about CHIPS and supply chain aren't notably oversized.
- Ms. Cuthill asked for a motion to approve all the findings.
 - Mr. Katsioulas requested this include addressing Mr. Chan's suggestion to either add a critical infrastructure vulnerability finding or distribute associated content across other findings.
 - Mr. Chan stated he would place that content in cybersecurity, smart communities, infrastructure, and potentially transportation.
 - Mr. Witte added that he would highlight the specific added text for the final review copy.

- Ms. Cuthill pointed out that since the text was not available, clarity was needed whether the board was comfortable with the proposed additions being handled as an editorial change. She said the alternative was to develop the text of a critical infrastructure finding immediately.
 - Mr. Chan pointed out that there would need to be a recommendation associated with such a finding.
 - Mr. Katsioulas suggested that several existing recommendations that bear on critical infrastructure topics would apply.
 - Mr. Bergman stated he viewed new material developed to address this topic as likely to be a substantive change, but that he was willing to review proposed editorial changes. There were no objections to treating this as an editorial change.
 - Ms. Rerecich questioned how necessary it is to address this point.
 - Mr. Katsioulas described this as a question of priorities give the geopolitical environment, concluding he believed this is an important topic.
- Mr. Chan summarized that this is an important topic that should be included in the report conclusion and identified as important for the IoTFWG to consider.
 - Mr. Griffith, Mr. Bergman, and Mr. Katsioulas concurred with that approach.
 - Mr. Katsioulas noted that the board’s records contain substantial discussion on the subject.

Motion to Accept the Findings

Motion (moved / seconded)	1. Accept all of the findings in the report as findings of the board. (Mr. Griffith / Ms. Rerecich)
Objections / Amendments	• None
Result	1. The findings were accepted without objection.

Discussion Points:

- Mr. Chan requested confirmation that board members can still submit editorial changes.
 - Ms. Cuthill responded in the affirmative for non-substantive instructions, saying that ideally those instructions for the editors would be placed on the record today, and that board members will be able to object if they feel the instructions weren’t followed.
- Mr. Caprio requested clarification regarding who would be part of the editorial process.
 - Ms. Cuthill stated that a deadline date will be set by the close of meeting for the whole board to make editorial requests. She said an updated report will then be circulated to confirm those requests were addressed and to provide an opportunity for any board member to object to a change as substantive. She said any such objections would be addressed, either by withdrawing the change or holding another meeting.
 - Mr. Caprio volunteered to be involved in the editorial process, citing his concerns over the new language that had appeared between the June 4 and June 13 versions.
 - Mr. Katsioulas pointed out that the changes Mr. Caprio was referring to were triggered by the instructions Mr. Chan provided along with the June 4 report draft.
 - Mr. Witte stated that voting to approve the findings did not imply approval of all of the content of the report but rather to approve the core of the findings. He acknowledged that there had been a significant volume of changes to the June 4 draft based on the input he had received, and those changes were the reason to provide for another round of review. He said the situation was created because of receiving valuable input from multiple sources. Mr. Witte said the motion was regarding whether the findings are identifying the right underlying issues.

- Mr. Chan described the primary issues “what is a sufficient amount of time to adequately review?” and acknowledge the challenges created by the board’s monthly meeting schedule. He stated it was important to define what would be a sufficient amount of time for the next review.
 - Ms. Cuthill asked if one week would provide sufficient time to submit final changes and instructions based on the June 13 draft report.
 - Mr. Witte stated his preference to product a clean “June 14” version that incorporated a change to a change under transportation as the starting point for feedback.
 - Mr. Katsioulas stated that the recommendation moves and renumbering needed to be included in the next review version.
 - Mr. Witte proposed the following schedule:
 - Review comments to the “June 14” draft to be returned by June 21
 - Draft final report sent to the board members by June 28
 - Final approval provided by board members by July 8
 - Ms. Cuthill clarified that Mr. Witte’s proposed schedule assumes the board approves the substance of the report at the current meeting.
 - The board members concurred with the proposed schedule.
 - A vote was held and the motion to accept the findings was approved without objections.

Discussion Prior to Accepting the Substance of the Report

- Mr. Witte asked Mr. Caprio whether KR1.1, regarding establishing a national strategy, should have an initial noun, as with the other recommendations, or whether the noun was deliberately omitted there.
 - Mr. Caprio responded that the presentation should be consistent and said the wording “Congress and the Exec Branch should work together ...” for that KR.
- Mr. Caprio confirmed Ms. Cuthill’s explanation for the selection of Congress, Executive Branch, or White House as the guiding principle for targeting the recommendations.

Motion to Accept the Substance of the Report

- Ms. Cuthill asked if the board was ready to vote to approve substance of report. She described the substance as including the recommendations and findings, as well as the overall structure of the report.
- Mr. Chan inquired about the scope of “the substance”, noting that while the recommendations and findings have been approved the conclusion and letter from the chairs have not yet been drafted.
 - Ms. Cuthill stated that the letter from the chairs is not from the board.
 - Mr. Bergman stated that he considered the conclusions to be editorial unless a board member raised an objection that something was substantive.
 - Mr. Griffith concurred.
 - Ms. Cuthill noted that the creation of an appendix documenting the work the fact of the speakers to the board and the linking of their presentation does not require board review.

Motion (moved / seconded)	1. Accept the substance of the report. (Mr. Caprio / Mr. Griffith)
Objections / Amendments	● None
Result	1. The substance of the report was accepted without objection.

Discussion Points:

- Ms. Cuthill invited Mr. Katsioulas to present his analytics of the report content.
 - Presentation: [IoT Advisory Board Report Overview](#)
 - Spreadsheet: [IoT Advisory Board Report Analytics](#)
 - Mr. Katsioulas explained he had developed a spreadsheet with analytic details. He summarized that, of the report content, 30% (by page count) is findings and 47% is recommendations. He reported that the typical KR has 2-3 associated ERs, but some KRs have many small ERs. He noted his concern about the lack of a finding related to the cybersecurity of critical infrastructure. Mr. Katsioulas said he would provide the spreadsheet and presentation slides for board members to review in detail, including his list of the work he had identified to complete the report.

Summary and Work Left to Do

Up-front section		13.0	6.9%	
Introduction to the Internet of Things		21.0	11.2%	
Findings of the IoT Advisory Board.		56.0	29.8%	29.8%
Establishing a National IoT Strategy		18.3	9.7%	
Modernizing IoT Infrastructure		17.2	9.1%	
Establish Trust in IoT		17.9	9.5%	
Fostering an IoT-Ready Workforce		4.7	2.5%	
Facilitating Industry Adoption of IoT		20.0	10.6%	
Promoting an IoT Enabled Economy		9.1	4.8%	46.3%
Conclusion and Miscel		11.0	5.8%	
TOTAL (Approx if fit with no gaps)		188.2		

- Add end paragraph in findings pointing to recommendations (and links)
 - Add reference to recommendation in corresponding findings (and links)
 - Make titles shorter and improve clarity of content. Fix grammar and spelling
 - Add and make graphics clear. Make all URLs consistent (put in footnotes)
 - Other items TBD
- Ms. Cuthill described the analysis that the report is 75% findings and recommendations as indicating the focus in the right place.
 - Mr. Caprio thanked Mr. Katsioulas for the analysis. He expressed concern that the findings take up 29% of the report, saying he anticipated that Congressional staff would skip to the recommendations.
 - Ms. Cuthill reminded the board that the findings are an integral part of the report called for in the legislation and the charter and are relevant to understanding of the recommendations.
- Mr. Chan reminded board members that in their review of the next version they have the opportunity to identify the recommendations they would prioritize.
 - Mr. Witte added that these priorities would be included in the call to action in the report introduction.
- Ms. Cuthill displayed Mr. Katsioulas spreadsheet of analytics, which she said would be included with the meeting material on the website along with the associated presentation.
- A vote was held and the motion to accept the substance of the report was approved without objections.

- Mr. Katsioulas requested the chairs provide the board members a list of next steps and the timelines so there is clarity regarding the process to finalize the report.
- Ms. Cuthill emphasized the importance of quickly identifying concerns about possibly substantive changes.
- Mr. Chan convey his and Mr. Caprio's thanks to the board members for their work and turned the meeting back to Ms. Cuthill.

Ms. Cuthill adjourned the meeting.