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)

February 27 & 28, 2024

Virtual Meeting Platform: Webex

MEETING MINUTES

Board Members	**Board Chairs and NIST Staff**
• **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 • **Prof. Kevin T. Kornegay**, Morgan State University • **Ann Mehra** • **Robby Moss**, Moviynt • **Maria Rerecich**, Consumer Reports • **Debbie A. Reynolds**, Debbie Reynolds Consulting • **Peter Tseronis**, Dots and Bridges LLC **Board Members Absent:** • **Debra Lam**, Georgia Institute of Technology • **Dr. Arman Shehabi**, Lawrence Berkeley National Laboratory	• **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) • **Wendy Szwerc,** NIST Contractor (Scribe)

Action Items Over Both Days

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

Following the meeting:

- Mr. Witte to send out the latest spreadsheet of recommendations / categories (1/2/3)
- Mr. Witte to share list of IoTFWG agencies discussed in meeting

Board Members to provide specific revisions and writing:

- **Mr. Chan** - to create a new recommendation inspired by ER1.1.4 or rewrite it to broaden scope.
- **Mr. Griffith** - to lead re-write of KR2.2 and ERs 2.3.1, 2.3.2, 2.3.3 on interoperability.
- **Mr**. **Griffith** to review and revise ER5.2.3 on drones.
- **Ms. Mehra and Ms. Coughlin** to review and revise ER5.4.1 on stockpiles.
- **Ms. Reynolds (with Mr. Bergman)** - to revise ER3.3.7 to identify an applicable method for achieving this labeling (board wanted to reference location tracking and tie it to something. There also a vague reference to draft legislation in 2019).
- **Dr. Chandra** and **Mr. Bergman** - to revise ER5.2.1 on farm of future (Moving away from Land Grant University language and gravitating towards specific value in LGUs with extension centers and associated language).
- **Mr. Tseronis** – to write up additional language for ER1.1.4 on upgrading legacy federal owned or operated buildings.
- **Mr. Chan, Mr. Katsioulas, and Mr. Witte** to review and revise KR3.4 and ERs 3.4.1, 3.4.2, 3.4.3, 3.4.4, and 3.4.5 on supply chain, business ecosystems, and digital threads.
- **Mr. Chan and Mr. Katsioulas, and Mr. Witte** to review and revise KR6.2, and ERs 6.2.1, 6.2.2, and 6.2.3 on Public Private Partnerships, digital transformation, and digital marketplaces.
- **Mr. Chan** to revise and broaden KR6.3 and ER6.3.1 to include other AI considerations and topic areas (**Mr. Griffith** mentioned he would propose some overall AI updates).
- **Mr. Witte** to revise Recommendation 9 / KR6.A on domestic IoT manufacturing chain in context of other supply chain revisions (**Mr. Griffith** mentioned he had targeted suggestions).
- **Need volunteer** – ER5.6.1 on IoT repositories remains in the parking lot and could use some review ahead of next meeting.
- **Need volunteer** – Within KR6.1 there was a call to the board for the development of a metric.

Editors to:

- Look at gaps between recommendations to findings
- Review contributions and edit into the report the revisions from board members above.
- Revise these recommendations for the next meeting:
    - All of the workforce theme needs revision to recommendations and supporting subtext
    - Inclusive of workforce, ER5.1.2 on student loan forgiveness will be reviewed
    - KR5.3 text will be changed from “smart cities” to “smart communities”
    - KR5.7 on adoption for smart transit and ER5.7.1 within broad set of recommendations will be reviewed to ensure they have specific actions
    - Rebuild KR6.1 as originally constructed to highlight advancing IoT for logistics/supply chain (FWG comment had a comment that logistics was underrepresented)

Timeline/Graphics Support:

- Mr. Witte/Chairs/NIST to amend the timeline for the action items identified
- All board members to submit all source graphic material for graphics previously submitted in the report (needed for the graphic artist)

IoTAB Meeting on Tuesday, Feb 27, 2024

Chair Opening Remarks Action Item Review

Ms. Cuthill, Mr. Chan

Ms. Cuthill opened the meeting, welcomed the attendees, and introduced the chair, Mr. Benson Chan.

Document: Chairman's Slides

- Mr. Chan went over the agenda and goals for the 11th meeting of the Internet of Things Advisory Board (IoTAB):
  - Baseline understanding of the current state of the report draft
  - Understanding of the report themes and narrative (mappings of findings, recommendations to themes)
  - Understanding of ALL recommendations
  - Approval/rejection process of recommendations for final report
  - Approval/rejection process for report
  - Identify gaps in content, findings and recommendations
  - Set expectations for the April meeting

Timeline Review

Mr. Witte, Mr. Chan

- Mr. Witte discussed the latest timeline, explaining that the goal was to have a final iteration of the report by the end of March. He stated the need to significantly reduce the page count prior to the April meeting.
- Mr. Witte showed the status of the report, including structure and current and nominal target page counts.
- Mr. Chan explained that the report had been shortened by 40 pages between the first draft and the current draft. He noted that the recommendations occupy the bulk of the current report, taking 110 pages, followed by the findings section at 64 pages. He said these sections would be cut the most to reduce the report to the target length of 150 pages (excluding appendices) that the board had discussed.
- Mr. Chan referenced his January meeting discussion regarding ranking recommendations as category 1, 2 and 3 as a mechanism to identify those that might potentially be cut, combined with others, or placed in an appendix.
- Mr. Katsioulas stated that he had carefully reviewed the report and shared several points:
  - He believes the target page count is achievable but expressed concern that the process must keep track of the relationship between findings and recommendations, saying it was important to look both top-down and bottom-up.
  - He identified some structural concerns, noting that the "iot.gov" concept is not discussed and that there is no section on international strategy. He suggested the international strategy could be linked to EU / U.S. Technology Trade Council meetings and the Trans-Atlantic Technology Agenda.
  - He stated that the augmented supply chain material is missing from the current draft. He pointed out that supply chain logistics and traceability are intimately related and are a core part of the enabling legislation.

  - He described the workforce content as "very fragmented" and suggested a comprehensive section to discuss that subject.
  - He suggested that the NDAA legislation creating the board should be discussed immediately after the executive summary, followed by a few stories motivating the board's work and recommendations.

- Ms. Mehra added that NIST has been asked to create a workforce AI model. She suggested NIST's work and White House statements are motivations to have a separate workforce section.
- Mr. Chan said there is content on workforce but there may be recommendations that haven't been incorporated which may address Mr. Katsioulas' and Ms. Mehra's concerns.
- Mr. Witte expressed thanks for the comments. He added that he would ensure the supply chain recommendations were reviewed during the meeting.
  - Mr. Katsioulas responded that he and Mr. Moss should work to reduce the supply chain content to fit the page budget.
- Mr. Witte summarized that the general approach seemed acceptable to the board.

IoT Federal Working Group (IoTFWG) Feedback and Comments

Mr. Witte, Mr. Chan

- Mr. Chan and Mr. Witte initiated a discussion of the IoTFWG's informal feedback, based on the IoTFWG's pre-read of the board's public draft report.
- Mr. Chan presented a slide listing the general comments received from the IoTFWG, with subsets of those comments connected to themes he had identified:
  - Make the recommendations more compelling
  - Shorten the report
  - Ensure terms used in recommendations are clearly defined
  - Fill gaps in the report's content
- Mr. Witte said the IoTFWG members were encouraged by the report's direction but overwhelmed by the volume. He said the overall message was that the report needs to be compelling to a non-technical audience. He said the board needed to identify the most compelling recommendation and justify why they are important. He cited the need to be clear about the national, societal, and economic benefits that implementing the recommendations can generate. He noted the opportunity to be clearer on specifics in presenting the recommendations.
- Mr. Katsioulas stated he believe that the report discusses barriers but needs to better present benefits and economic value that justify investing in IoT.
- Ms. Mehra noted that IoTFWG comments indicate questions regarding how the board looks at IoT. She suggested the creation of graphics indicating the board's view of what IoT is and is not; she also noted there are related questions about the meaning of IoT ecosystems. She further noted the comment regarding standards appeared to warrant board discussion.
  - Mr. Witte agreed that an illustration could be helpful. He acknowledged that inconsistencies have developed as the report was integrated from various inputs that used different modifiers and agreed those inconsistencies need to be addressed.
  - Mr. Katsioulas noted the board has had numerous discussions about the definition of IoT, adding that Ms. Megas had recommended a broad view. He disagreed with spending more time defining IoT.

- Ms. Megas pointed the board to the NDAA language, saying that the NDAA doesn't limit the board to considering IoT devices but rather to look broadly at IoT technologies. She said the IoT ecosystem "includes the internet and the things". She gave the example of "interoperability of IoT devices" as one area where it is important to be clear about where the interoperability issues exist, is it related to protocols, data, platforms, etc.
- Mr. Katsioulas suggested quoting the NDAA and then being clear that economic growth from an IoT ecosystem also requires adjacent technologies and business ecosystems. He stated that including the NDAA language would remove ambiguity.
- Prof. Kornegay suggested avoiding the word devices, in favor of discussing enterprises, which he described as "all encompassing".
- Ms. Reynolds suggested the term "connected systems".
- Mr. Katsioulas pointed out that "ecosystem" could cover everything.
- Prof. Kornegay suggested employing use case examples to put things in context.
- Mr. Katsioulas agreed and suggested continuing the discussion when reviewing the findings.
- Mr. Witte suggested that in many cases, clarification will happen by deletion, by removing unneeded modifiers.
- Mr. Bergman pointed out the FCC definition of IoT in the Cyber Trust Mark proceeding. He suggested the board could cite the FCC definition and address any issue the members have with that, such as including devices with wired network connections for completeness. He noted that the product structure in the FCC definition takes into account cloud components and IoT hubs.

- Mr. Chan presented a slide listing the specific comments received from the IoTFWG, with subsets of those comments connected to themes he had identified:
  - The appropriate roles of government and industry
  - Unclear recommendations or problematic wording
  - Recommendations that would be more helpful if they considered additional facts.
  - Connection of recommendations to existing government efforts or strategies
- Mr. Witte noted other aspects of these comments:
  - He said there was pushback when the board focused on specific government offices, although he said often the offices named were intended as examples but not perceived as such by the IoTFWG.
  - He said there was a lot of pushback on the idea of monetizing the data as something not appropriate for the government and the relationship to the originators of the data was unclear.
  - He pointed to feedback asking why industry hasn't already implemented a good idea, and the need to be very clear about the rationale for why the government needs to step up in areas where industry has not.
- Mr. Katsioulas acknowledged that the concept of "data sharing" is problematic, saying that monetizing data doesn't mean sharing the data. He asserted it was important to correct any misunderstanding about this, and that the intent was to facilitate the infrastructure and mechanisms that lead to analytics and monetization.
  - Mr. Witte responded that the IoTFWG's question was who would own the data, and suggested the board giving a description of providing an analytic capability rather than a shared repository could help.
- Mr. Witte noted several other comments:
  - Regarding autonomous vehicles: "autonomous" is used incorrectly. He said he had replaced the term with "automated" in the most recent draft.

  - There are IoTFWG comments about spectrum where assistance from the board's subject matter experts is needed with responding to those comments.
  - In some cases, it is unclear whether "barriers" refers to barriers to implementation of a recommendation, or existing barriers that would be resolved by a recommendation.

- Mr. Witte shared a spreadsheet of the informal feedback received from the IoTFWG, reminding the member that the Board is an independent steering committee and the IoTFWG's feedback is not direction.
  - Ms. Cuthill stated the IoTFWG comments are meant to be helpful to the board, adding that the IoTFWG struggling with a recommendation implies that it will be difficult for the recommendation to be implemented. She said the comments are intended as constructive feedback.
- Mr. Witte stated the board needs to make the case for the return on investment for their recommendations. He said it is important to focus on the compelling recommendations. He said it would be beneficial to think about how we can measure success, define metrics, and identify how to know that a recommendation has been successfully implemented.
- Mr. Witte noted the IoTFWG's question regarding the board's discussion of standards, looking for clarity on when there is a call for a new standard, and said this should receive the board's attention while revieing the recommendations.
  - Mr. Bergman noted the word "standard" shows up 300 times in the draft and suggested that most often the board means common adherence to standards to achieve interoperability rather than development of a technical standard. Mr. Griffith and Mr. Katsioulas agreed with this interpretation.
  - Mr. Katsioulas requested the IoTFWG's comments be circulated to the board for detailed review and the opportunity to reframe recommendations to make them actionable.
  - Ms. Megas noted the need to distinguish between technical standards, and the concept of "standard of care" as it relates to safety.
- Mr. Witte described the board's review at this meeting as an opportunity to consider the verbs being used and see if they can be strengthened.
  - Mr. Chan added that if a recommendation cannot be made actionable that could be a reason to consider cutting that recommendation or combining it with others.
- Mr. Witte noted IoTFWG feedback about the board's satellite recommendation, saying the recommendation needed to be clear that its intent was to describe approaches to better leverage the existing satellite infrastructure to benefit IoT.
- Mr. Witte noted the IoTFWG comment on the allocation of spectrum.
  - Mr. Bergman expressed disagreement with the comment, saying it conflicted with his experience in spectrum policy.
  - Mr. Katsioulas stated he believed the board should consider mapping spectrum requirements to a recently released strategy that included 5G/6G considerations.
  - Prof. Kornegay noted 5G/6G is a major technology item in the CHIPS Act.
- Mr. Witte noted several IoTFWG comments regarding potential for extending the Cyber Trust Mark program or recommending a similar approach for the industrial IoT.
- Mr. Witte noted the IoTFWG comment pushing back on the public safety IoT stockpile concept, including concerns about the logistics and generally saying that it is not an appropriate action for government.

- Mr. Witte pointed to IoTFWG feedback asking the board to reconsider where recommendations used "must" rather than "should".
- Mr. Chan asked for clarification on whether consumer IoT was within the board's scope, noting that the term doesn't appear in the charter.
    - Ms. Cuthill explained that the charter is quoting the NDAA, which does not include the term "consumer", but the board can consider other sectors beyond the charter and consider other sectors with a focus on enhancing the adoption of IoT and gaining value from IoT. However, the board should be careful about expanding scope.
    - Ms. Rerecich asserted that consumer is a major segment of IoT that cannot be ignored, particularly regarding the role of trust in promoting adoption of IoT.
    - Mr. Katsioulas suggested that consumer and smart home IoT are examples of mature market sectors that can be extrapolated to other sectors when considering how to improve adoption in those sectors.
- Mr. Witte noted the potential to make a more compelling case for a recommendation if it can be linked to work that agencies are doing. He described this as a source of good examples of rationales for the board's recommendations.

Review Approval/Rejection Process

Mr. Chan

- Mr. Chan presented the planned review process for the meeting to review and approve the 22 key recommendations and 94 enabling recommendations. He described a process with three steps:
    - Step 1: Confirm the baseline, which organizes the recommendations under six themes. This step is also intended to identify gaps.
    - Step 2: Approving the recommendations as blocks of key and associated enabling recommendations, tabling any that need more discussion. Also, assign category 1/2/3 rankings to the recommendations. (Pass One)
    - Step 3: Address tabled recommendation. (Pass Two)
- Mr. Katsioulas requested adding confirming the mapping of recommendations to findings as part of the process.
- Mr. Chan asked NIST for the definition of consensus.
    - Ms. Cuthill explained that the goal is to reach a form of the recommendations that everyone can live with, ensuring everyone is heard, and making necessary changes to the recommendations so that everyone can live with them.
- Mr. Chan described the voting process, saying the plan is to discuss the recommendation, then call for a vote on a motion to accept. Motions need to be seconded.
- Mr. Katsioulas asked how public feedback to the posting of the board's results would be handled, and asked if that feedback was desirable.
    - Mr. Witte reminded members that every pre-read has been publicly available
    - Ms. Cuthill stated that NIST and the board are always open to comments and any comments from the public will be made available to the board. She added that all written comments and all comments presented to the IoT Advisory Board are part of the public record.

Report Structure

Mr. Witte, Mr. Chan

- Mr. Witte shared a spreadsheet of the recommendations to give the board members a clear picture of the grouping of key and enabling recommendations, which will be discussed and voted on as blocks. He explained that the spreadsheet also reflects a number of recommendations that have been "removed" through integration with other recommendations.
- Mr. Chan reviewed the process the board had followed to get to the current set of recommendations and showed a diagram of the relationship among the themes:
  - Activities where the government can exercise leadership
  - "Enablers" such as infrastructure modernization, trust, and workforce recommendations
  - Facilitating adoption
  - Unlocking the IoT enabled economy
- Mr. Katsioulas expressed enthusiasm for the structure Mr. Chan presented.
- Mr. Witte and Mr. Chan clarified that the review of the report content would work "bottom up" through the themes shown in the diagram.

Review Six Themes

Mr. Witte, Mr. Chan

- Mr. Chan presented a "bird's eye view" of the six themes and associated key recommendations, which he acknowledged was hard to see from the spreadsheet view. He also presented individual slides for each theme showing the groupings of key and associated enabling recommendations. He said the goal of this portion was to confirm the baseline high-level organization and noted that the editors have consolidated and reorganized some of the recommendations.
  - Mr. Katsioulas asked if digitalization would be under modernizing infrastructure. He noted that lack of digitalization has been cited as one of two major barriers to the adoption of IoT. Mr. Katsioulas stated he believed modernizing infrastructure is the right location to discuss digitalization.
  - Mr. Witte agreed regarding the placement but said there aren't specific recommendations that address Mr. Katsioulas' points because it was difficult to tie them to specific recommendations for government action. He said this might be an example of a gap that needs filling and that the editors would be looking for guidance on topics like this during the meeting.
  - Mr. Bergman expressed concern that digitalization is "too abstract from IoT" and that it is unclear how to tie incentives for digitalization to IoT.
  - Mr. Chan described Mr. Katsioulas' view of digitalization as very broad and suggested there might need to be a finding with a recommendation to seek ways to encourage industry to modernize and digitalize.

Themes and Mapping Overview

Mr. Witte, Mr. Chan

- Mr. Witte reviewed the *Government Leadership theme*, noting that the board is clearly calling for a strategic approach similar to other federal government strategic approaches. He summarized the group

of recommendations as calling for more federal use of IoT, more support for research in IoT, and also focusing on support for small businesses and on international collaboration.

- Mr. Katsioulas suggested making the international collaboration aspects broader, encompassing IoT and adjacent critical and emerging technologies.
  - Mr. Chan asked if there is another key recommendation for this.
- Mr. Witte suggested removing "supply chains" from the key recommendation wording and addressing it in the supporting text connected with discussion of international collaboration.
- Mr. Chan asked Mr. Bergman is there a separate enabling recommendation under international collaboration related to Chinese sourced technology.
  - Mr. Bergman advised against adding such a recommendation due to the complexities of policy in this area.
- Ms. Mehra asked if the IoTFWG had provided any feedback on international, and Mr. Witte replied there was none.
- Mr. Chan suggested the possibility of creating new key recommendations encompassing the enabling recommendations involving research and the federal use of IoT.
  - Mr. Tseronis agreed with a key recommendation associated with federal use, pointing out that there is a Binding Operational Directive (BOD) about upgrading federal buildings. He stated there is value in referencing other guidance being promulgated by the Executive branch.
  - Mr. Chan recommended creating the two key recommendations he had described.

- Mr. Witte reviewed the *Modernize Infrastructure theme*, noting this includes the potential to learn from and share with other nations regarding best practices.
  - Several board members expressed concern about the enabling recommendation to establish data repositories. Mr. Chan deferred discussion on the particulars of that recommendation.
  - Mr. Chan observed that the enabling recommendations regarding standards could potentially be combined.
  - Mr. Witte expressed caution about getting too homogenous when consolidating recommendations, pointing to the example of interoperability for IoMT. He acknowledged there are opportunities to combine recommendations without losing fidelity.

- Mr. Witte reviewed the *Establish Trust theme*, noting it has been a key topic since the board started work. He stated there are many cybersecurity and privacy recommendations and that this theme is more detailed than other sections of the report, so it will be important for the board to consider what is the right level of detail. He pointed out that trusted architectures had been moved into this theme.
- Mr. Witte reviewed the *IoT-Ready Workforce theme*, saying that his efforts to reorganize weren't fully successful and that the specifics of these recommendations still needs to be worked out. He said this was partly a consequence of promoting the workforce theme within the report structure to parallel the trust and infrastructure modernization themes.
  - Mr. Chan suggested organizing this content around the four areas: recruitment (points of bringing people into the workforce, development (providing the workforce with the right skills), placement (the required roles and industries), and retention.
  - Prof. Kornegay recommend connecting the IoT workforce development theme to the CHIPS Act's workforce development aspects.
  - Mr. Katsioulas concurred, suggesting that the board could borrow from the principles in the CHIPS act, but adding that IoT workforce skills would vary by industry.
  - Prof. Kornegay added that there won't be advancement in IoT without the workforce. He pointed out the international competition aspect, noting the growth in academic papers from Chinese

universities. He noted there are U.S. efforts to tap into, such as workforce activities in the Department of Defense, undergraduate academia, and industry.

- Mr. Witte reviewed the *Facilitate Adoption theme*. He explained that this theme focuses on the government facilitating adoption and uses sector-specific examples. He said this theme has the largest quantity of enabling recommendations due to calling out sector-specific pieces, and that the board should review and determine if those specifics are really needed.
  - Mr. Chan observed that the enabling recommendation about student loan forgiveness could move to workforce, regulatory guidance for drones might be broader than agriculture, and that small farms are small businesses so could be addressed accordingly.
    - Mr. Witte acknowledged that "the right stories in the right" places could make the report more compelling.
  - Mr. Witte notes that the AI recommendations in this theme might be out of place, as AI had been moved to the government leadership theme.
  - Mr. Witte described this theme are the location for board members focused on specific areas to review the content focused on their interests. He suggested this also provided to opportunity to reduce text without losing content.
- Mr. Witte reviewed the *IoT Economy theme*, saying this used to be supply chain. He noted that this theme is another possible location for AI-related content.

Review/Approve Mapping of Findings and Recommendations to Theme

- Mr. Chan reviewed the findings. He described trying to link findings to key recommendations and looking for gaps. He noted there are findings around AI but no AI recommendations. He requested Mr. Katsioulas' help with connecting supply chain-related findings to recommendations, and also noted there are some recommendations that currently aren't aligned with any finding. He stated there may be a need to create additional findings for these.

Review of Key and Enabling Recommendations - Pass One

Mr. Chan, Mr. Witte

- Mr. Chan opened the process for considering recommendations, reminding members that the approach will be to:
  - look at key and enabling recommendations for each block,
  - identify any missing recommendations,
  - move recommendations that need additional discussion or rework to a parking lot,
  - assign ranks to recommendations,
  - edit recommendations if there is agreement on wording revisions
  - approve or disapprove each block.
- Mr. Chan clarified the meaning of the three categories:
  - Category 1 is a strategic bold recommendation with major impact who absence would be noticed.
  - Category 2 is a strategic recommendation that would achieve a "quick win" with significant impact and is doable in a short period of time.
  - Category 3 covers recommendations that don't fit category 1 or 2.

- Category 1 and 2 recommendations will appear in the main body of the report, but category 3 recommendations may be handled differently (e.g., appear in an appendix).

- Mr. Witte shared the spreadsheet of recommendations, and pointed out that the spreadsheet circulated as the pre-read has all of the original recommendations, so members can locate them if needed. Those recommendations were renumbered due to reorganization and theme changes, and this discussion will use the new numbers.
- Mr. Chan and Mr. Witte confirmed that these votes were to approve the recommendation wording but not specifically the supporting text in the report.
  - Mr. Witte replied that the goal of significantly shortening the report would require significant text changes and that it was the responsibility of the editors to ensure it accurately supports the recommendation. He added the board will still have the opportunity to approve the full report, and pointed out that debating the prose during the meeting was impractical. Ms. Cuthill indicated that the wording changes to the recommendations, once they were approved, would be very minimal.
- There was concurrence during discussion that it is acceptable to have a key recommendation with no accompanying enabling recommendations.
- Each key recommendation was read into the record during the course of the meeting.

Note: Key Recommendations are notated as "KR" and Enabling Recommendations are notated as "ER".

Note: The consideration of recommendations for each pass is presented in the order they appear in the February 23, 2024, draft report, which is generally the order of discussion during the meeting.

Note: Recommendations noted as being "moved to the parking lot" were set aside to address during Pass Two.

Theme: Government Leadership / Topic: Strategic National Approach

Recommendations	KR1.1, ER1.1.1, ER1.1.2
Recommendation Text	**KR1.1:** The IoTAB recommends a strategic national approach for taking full advantage of the opportunity presented by the IoT. **ER1.1.1:** IoT must be added back to the critical and emerging technology list. **ER1.1.2:** Congress should further improve and elevate inter-agency coordination.
Motions (Moved / Seconded)	1. Rank KR1.1 as Category 1 (Mr. Katsioulas / Mr. Chan) 2. Include KR1.1 in the report (Mr. Chan / Prof. Kornegay)
Objections / Amendments	● ER1.1.1: Concerns regarding the "must" wording in ER1.1.1 ● ER1.1.2: Disagreement over ranking and need for potentially significant wording changes.
Result	1. KR1.1 was approved without objection. 2. ER1.1.1 and ER1.1.2 were moved the parking lot.

Discussion Points:

- On ER1.1.1:
  - Mr. Bergman asked whether a decision has been reached regarding the "must" wording in this ER, which the IoTFWG had objected to.

- Ms. Cuthill recommended moving this ER to the parking lot pending the availability of Mr. Caprio, who had previously strongly endorsed the "must" wording.
- The ER was moved to parking lot prior to any motions.

- On ER1.1.2:
  - This ER was moved to parking lot due to disagreement over ranking and potentially significant wording changes.

Theme: Government Leadership / Topic: Federal Government Activities

Recommendations	KR1.A (new), ER1.1.3, ER1.1.4, ER1.1.5, ER1.1.6
Recommendation Text (including amendments)	**KR1.A:** applying a national strategic approach to federal activities in IoT adoption. (placeholder text to be updated Day 2) **ER1.1.3:** The government should fully fund existing IoT research, development, deployment and demonstrations *already approved and taking place throughout the federal government*. **ER1.1.4:** The government should consider upgrading legacy federal owned or operated ~~buildings~~ *assets* that have inadequate security in their connected systems. **ER1.1.5**: The government should specify and use, for federally-funded projects, IoT technologies and applications that are energy efficient, sustainable, and "smart". **ER1.1.6:** The federal government should continue to support and fund technology research, through industry, ~~university~~ *academia* and its national labs, to further advance and accelerate the development of IoT technologies and its enabling infrastructure.
Motions (Moved / Seconded)	1. Rank KR1.A as Category 2 (Mr. Chan / Mr. Bergman) 2. Rank ER1.1.3 as Category 1 (Mr. Bergman / Prof. Kornegay) 3. Rank ER1.1.4 as Category 2 (Mr. Bergman / Mr. Griffith) 4. Rank ER1.1.5 as Category 2 (Mr. Chan / Mr. Griffith) 5. Rank ER1.1.6 as Category 1 (Mr. Chan / Mr. Griffith) 6. Include KR1.A and ERs 1.1.3, 1.1.5 and 1.1.6 in the report (Mr. Griffith / Mr. Bergman)
Objections/ Amendments	● ER1.1.3 amended by adding words to clarify its scope. ● ER1.1.4 amended to change "buildings" to "assets". ● ER1.1.6 amended to change "university" to "academia"
Result	1. KR1.A, ER1.1.3, ER1.1.5, and ER1.1.6 were approved without objection. 2. ER1.1.4 was moved to the parking lot.

Discussion Points:

- Mr. Chan asked for clarification regarding the distinction between ERs 1.1.3 and 1.1.6.
  - Ms. Rerecich stated that the text clarifies that ER1.1.3 is referring to federal projects "already approved and taking place throughout the federal government."
  - Mr. Witte stated that ER1.1.6 is research through "industry, university, and national labs."

- Ms. Rerecich added that ER1.1.6 does not specify "fully" fund.
- Mr. Witte proposed adding words from the text to clarify the scope of ER1.1.3; the board accepted this amendment.

- Mr. Chan observed that ER1.1.4 had been broadened from the original wording about the government employing IoT to encouraging IoT adoption through leading by examples.
  - Mr. Griffith added the original focus had been building control systems.
  - Mr. Chan stated he believed this recommendation was broader than buildings.
  - The board agreed to replaced "buildings" with "assets".
  - Several members pointed out that "security" in this ER refers to the cybersecurity of the connected systems.
  - Mr. Chan clarified that ER1.1.4 relates to the government's direct use of IoT, whereas ER1.1.5 relates to requiring federal contractors and other organizations receiving federal funding to employ IoT in their projects.
  - ER1.1.4 was moved to the parking lot due to uncertainties about scope and focus.
- ER1.1.6 was amended to change "university" to "academia" as a broader term.

Theme: Government Leadership / Topic: Small Businesses and Startups

Recommendations	KR1.2, ER1.2.1, ER1.2.2
Recommendation Text	**KR1.2:** The government should accelerate IoT technology adoption *by small businesses and support small businesses* ~~as well as~~ *IoT technology development and* manufacturing. ~~For small businesses and startup organizations. This can be done via policies, procedures, and funding methods that specifically target them.~~ **ER1.2.1:** The government should accelerate the adoption of IoT technologies manufactured by small business*es* and startup organizations through targeted Federal Government programs, policies, procedures, and funding methods. **ER1.2.2:** The government should accelerate the adoption of IoT technologies ~~manufactured~~ by small businesses~~ and startup organizations~~.
Motions (Moved / Seconded)	1. Move ERs 1.2.1 and 1.2.2 to group with KR1.A (Mr. Berman/ Mr. Griffith) 2. Vacate the motion to regroup ERs 1.2.1 and 1.2.2 with KR1.A (Mr. Griffith / Ms. Rerecich) 3. Rank KR1. 2 as amended as Category 2 (Ms. Rerecich / Mr. Bergman) 4. Rank ER1.2.1 as Category 2 (Ms. Rerecich / Mr. Griffith) 5. Rank ER1.2.2 as Category 2 (Ms. Rerecich / Mr. Griffith) 6. Include KR1.2 and ERs 1.2.1 and 1.2.2 in the report (Ms. Rerecich/ Mr. Bergman)

Objections / Amendments	● The words "manufactured" and "and startup organizations" were struck from ER1.2.2 ● KR1.2 was reworded to read "… accelerate technology adoption by small businesses and support small business IoT technology development and manufacturing." ● "small business" was changed to "small businesses" as appropriate in the text of these recommendations
Result	1. KR1.2, ER1.2.1 and ER1.2.2 were approved without objection.

Discussion Points:

- Ms. Rerecich raised a concern that the wording of these recommendations was confusing.
  - Mr. Chan clarified that there are two concerns regarding small businesses. ER1.2.1 addresses their ability to adopt IoT, and ER1.2.2. address their challenges in getting IoT they manufacture into the marketplace.
  - There was consensus to strike the words "manufactured" and "and startup organizations" from ER1.2.2 to properly address its intent.
- The placement of ERs 1.2.1 and 1.2.2 was discussed.
  - There was a motion (Mr. Berman / Mr. Griffith) to join ER1.2.1 and 1.2.2 to the previous block with KR1.A. This motion was approved with Mr. Chan objecting.
  - Mr. Chan raised the concern that moving these ERs would lose their distinct focus on small businesses.
  - There was consensus to adjust the working of KR1.2, changing it to read "… accelerate technology adoption by small businesses and support small business IoT technology development and manufacturing."
  - There was a motion (Mr. Griffith / Ms. Rerecich) to vacate the prior motion shifting the placement of ERs 1.2.1 and 1.2.2. This motion was approved without objection.

Theme: Government Leadership / Topic: International Collaboration

Recommendations	KR1.3, ER1.3.1
Recommendation Text	**KR1.3:** The government should promote international collaboration in IoT adoption ~~across global supply chains~~ to share knowledge, best practices, and resources. **ER1.3.1:** The government should create internationally compatible data minimization guidance related to IoT devices, aligning with the NIST Privacy Framework and NIST Cybersecurity Framework principles.
Motions (Moved / Seconded)	1. Rank KR1.3 as Category 1, ER1.3.1 as Category 2, and incorporate the entire block in the report (Mr. Bergman/ Mr. Griffith)
Objections / Amendments	● KR1.3 was amended to strike the words "across global supply chains".
Result	1. KR1.3 and ER1.3.1 were approved without objection.

Discussion Points:

- There was consensus to strike the words "across global supply chains" from KR1.3.

Theme: Modernize Infrastructure / Topic: Data Sharing

Recommendations	KR2.1, ER2.1.1, ER2.1.2, ER2.1.3
Recommendation Text	**KR2.1:** The government should foster policies that encourage responsible and equitable sharing of IoT data and thereby drive economic growth, social benefits, and sustainability. **ER2.1.1:** The government should establish templates or best practices for clear and robust corporate policies regarding data sharing, usage, and licensing among parties in the IoT ecosystem. **ER2.1.2:** The government should partner with industry and collaborate with international allies to develop and support comprehensive data sharing policies that stimulate economic growth, social benefits, and sustainability. **ER2.1.3:** The government should establish data repositories for privately collected data.
Motions (Moved / Seconded)	1. Initially a motion from Mr. Bergman and Mr. Griffith was introduced but it was withdrawn due to the objections below.
Objections / Amendments	● Concerns were raised regarding the privacy implications of these recommendations.
Result	1. No vote taken; entire block moved to the parking lot

Discussion Points:

- The initial motion included ER2.1.3 but was withdrawn so it could be revised due to concerns about that privacy implications of this ER.
- Initially ER2.1.3 was moved to the parking lot, but the due to concerns raised about the data privacy implications of KR2.1 and all of its enabling recommendations, a motion to include KR2.1 in the report was withdrawn.
- The entire block (KR2.1 and ERs 2.1.1-2.1.3) was moved to the parking lot.

Theme: Modernize Infrastructure / Topic: Interoperability

Recommendations	KR2.2, ER2.2.1, ER2.2.2, ER2.2.3
Recommendation Text	**KR2.2:** The government should establish methods to foster interoperability for technology, including through the use of consistent models, protocols, application, interfaces and schemas. **ER2.2.1:** The government should work with various organizations to facilitate interoperability through the development of a consistent data taxonomy for the sharing and exchange of data collected from IoT and non-IoT sources. **ER2.2.2:** The government should support research and industry-led standards in areas such as telematics and sensor technologies for automated vehicles. **ER2.2.3:** The government should promote and adopt industry led standards, guidelines and protocols for minimum baseline interoperability for smart

	transportation technologies and corresponding transportation infrastructure (i.e., sensors in roads, cameras at intersections).
Motions (Moved / Seconded)	1. None
Objections / Amendments	● Concerns were raised regarding the logic of combining these recommendations into a group.
Result	1. No motion was made; entire block moved to parking lot

Discussion Points:

- Several board members raised concerns that this block of recommendations was not coherent, due in part to combining recommendations from several topics.
- The entire block (KR2.1 and ERs 2.2.1-2.2.3) was moved to the parking lot to enable revision for consistency.

Theme: Modernize Infrastructure / Topic: Standards Development

Recommendations	KR2.3, ER2.3.1, ER2.3.2, ER2.3.3, ER2.2.4
Recommendation Text	**KR2.3:** The government should promote collaborative development across industries to adopt ~~existing~~ industry standards and protocols. **ER2.3.1:** The government should advocate for the implementation and adoption of interoperable data standards for public safety IoT. **ER2.3.2:** The government should promote and, if necessary, develop a protocol for data exchange standards for IoMT (Internet of Medical Things) for interoperability, and promote the adoption of these standards. **ER2.3.3:** The government should promote the development and use of standards for supply chain logistics, traceability, and assurance. **ER2.3.4:** The government should promote standards and protocols for IoT technology in supply chain management to provide assurance of interoperability, reliability, and security across various IoT systems and devices.
Motions (Moved / Seconded)	1. Rate KR2.3, as amended, and all ERs as Category 2 and incorporate the entire block in the report (Mr. Bergman / Mr. Griffith)
Objections / Amendments	● The term “existing” was struck from KR2.3 based on concerns that the KR didn’t clearly support both use of existing standards and development of new standards where necessary.
Result	1. KR2.3, ER2.3.1, ER2.3.2, ER2.3.3 and ER2.3.4 were approved without objections.

Discussion Points:

- Ms. Rerecich raised a concern that the wording of KR2.3 didn’t clearly support the development of new standards if needed.

- Mr. Bergman pointed out that the supporting text indicated that wholly new standard likely aren't needed and suggested deleting the word "existing" from KR2.3. This suggestion was accepted by the board.

Theme: Modernize Infrastructure / Topic: Availability of Connectivity

Recommendations	KR2.4, ER2.4.1, ER2.4.2, ER2.4.3
Recommendation Text	**KR2.4:** The federal government should expand and improve programs that ensure sufficient availability, reliability and connectivity for IoT in all areas of the country. **ER2.4.1:** To promote continued U.S. leadership on spectrum policy, the government should continue to make licensed and unlicensed spectrum available via spectrum sharing, repurposing underutilized federal spectrum and spectrum auctions. **ER2.4.2:** The government should increase funding and accelerate implementation of broadband deployment across rural America. **ER2.4.3:** The government should actively promote and support the adoption of satellite narrowband IoT systems, with the aim of improving connectivity, data collection, and decision-making in rural and remote areas, resulting in economic growth.
Motions (Moved / Seconded)	1. Rate KR2.4 and all ERs as Category 2 and incorporate the entire block in the report (Mr. Griffith / Ms. Rerecich)
Objections / Amendments	● None
Result	1. KR2.4, ER2.4.1, ER2.4.2, and ER2.4.3 were approved without objections.

Discussion Points:

- Ms. Rerecich referred to the IoTFWG comment on spectrum discussed earlier and asked if that was a concern for ER2.4.1.
  - Mr. Witte stated the IoTFWG comment was on the recommendation text and that Mr. Bergman had adjusted the wording of the recommendation in a prior draft of the report.

Theme: Establish Trust / Topic: Cybersecurity Improvement

Recommendations	KR3.1, ER3.1.1, ER3.1.2, ER3.1.3, ER3.1.4, ER3.1.5, ER3.1.6, ER3.1.7
Recommendations Text	**KR3.1:** The Federal Government should provide specific and consistent cybersecurity guidance for IoT providers and adopters to ensure secure operations in a whole-of-government approach. **ER3.1.1:** The government should strengthen cybersecurity measures focused on IoT across supply chain networks to address concerns around data privacy, security, confidentiality, trust, and potential risks associated with increased connectivity and interdependence of IoT systems.

	ER3.1.2: The government should consider additional ways to highlight those vulnerabilities most likely to be applicable to IoT product developers. **ER3.1.3:** The government should accelerate the promotion and adoption of procedures and methods to make the electric grid enabled by IoT more reliable and resilient. **ER3.1.4:** Congress and regulatory agencies should support domestic IoT cybersecurity labeling initiatives by establishing incentives for manufacturers to participate. **ER3.1.5:** Congress must ensure adequate and continuing funding for the Cyber Trust Mark consumer education campaign. **ER3.1.6:** The government should establish appropriate U.S. representation regarding international harmonization of IoT cybersecurity programs and requirements as such programs are established for domestic market sectors. **ER3.1.7:** The government should recognize and promote existing standards, and conformity assessment schemes that facilitate cybersecurity in industrial IoT applications.
Motion (Moved / Seconded)	1. Approve KR3.1 as Category 1, ERs 3.1.1 – 3.1.7 as Category 2 and include the block in the report. (Mr. Bergman / Mr. Griffith)
Objections / Amendments	• None
Result	1. KR3.1, ER3.1.1, ER3.1.2, ER3.1.3, ER3.1.4, ER3.1.5, ER3.1.6 and ER3.1.7 were approved without objection.

Discussion Points:

- Ms. Megas noted there is an OMB memorandum requiring Federal agencies to comply with the NIST guidelines on IoT.
  - Mr. Witte stated that the existence of the OMB memorandum indicated that progress would be measured.

Theme: Establish Trust / Topic: Data Privacy Legislation

Recommendations	KR3.2, 3.2.1
Recommendation Text	**KR3.2:** Congress should pass comprehensive privacy legislation. **ER3.2.1:** Congress should include IoT in proposed comprehensive privacy legislation.
Motions (Moved / Seconded)	1. Rate KR3.2 as Category 1, ERs 3.2.1 as Category 2 and incorporate the entire block in the report (Ms. Reynolds / Ms. Rerecich)
Objections / Amendments	• None
Result	1. KR3.2 and ER3.2.1 were approved without objection.

Discussion Points: None

Theme: Establish Trust / Topic: Data and Privacy Policy

Recommendations	KR3.3, ER3.3.1, ER3.3.2, ER3.3.3, ER3.3.4, ER3.3.5, ER3.3.6, ER3.3.7, ER3.3.8, ER3.3.9
Recommendation Text	**KR3.3**: The White House and Congress should facilitate/support the development of a Data and Privacy Policy Framework. **ER3.3.1**: The government should promote "Privacy by Design" in IoT device development, deployment, and implementation. **ER3.3.2**: The government should establish clear policies for third-party data sharing and IoT device data use **ER3.3.3**: The government should encourage the use of plain language in IoT privacy policies. **ER3.3.4**: The government should develop and implement privacy transparency mechanisms. **ER3.3.5**: The government should endorse universal opt-out signals for IoT devices and companion apps. **ER3.3.6**: The government should require IoT Privacy information on new car automobile "Monroney Stickers". **ER3.3.7**: The government should add "Location Tracking Enabled" notice to U.S. E-labeled IoT devices. **ER3.3.8**: The government should promote the use, development, and implementation of Privacy-Enhancing Technologies (PETs) in IoT systems. **ER3.3.9**: The government should follow NIST sanitization standards for government automobiles before resale and should encourage NIST sanitization standards for automobiles before resale.
Motions (Moved / Seconded)	1. Approve KR3.3 as Category 1, ERs 3.3.1-3.3.9 as Category 2, and include all in the board's report (Mr. Bergman / Ms. Reynolds)
Objections / Amendments	● Motion amended to remove ERs 3.3.6, 3.3.7, and 3.3.9 from the block ● Motion amended to change ERs 3.3.1 and 3.3.8 to Category 1
Result	1. KR3.3, ER 3.3.1, ER3.3.2, ER3.3.3, ER3.3.4, ER3.3.5, and ER3.3.8 were approved without objection. 2. ER3.3.6 and ER3.3.9 were removed from the block to be addressed separately. 3. ER3.3.7 was moved to the parking lot.

Discussion points:

- ER3.3.6 (Monroney Sticker content) and ER3.3.9 (vehicle data sanitization) were moved to a separate motion and discussion due to concerns about how broadly applicable these were.
- ER3.3.7 (Location Tracking Notice) was moved to the parking lot:
  - Ms. Reynolds pointed out it was intended to be part of the Cyber Trust Mark but may need to determine what it should be attached to.
  - Mr. Bergman commented that the Mark is a single QR code and does not provide a suitable label for this indicator.

Discussion resumed on the parking lot items ER3.3.6 (Monroney Sticker content) and ER3.3.9 (data sanitization for resold vehicles).

Recommendations	ER3.3.6, ER3.3.9
Recommendations Text	**ER3.3.6:** The government should require IoT Privacy information on new car automobile "Monroney Stickers". **ER3.3.9:** The government should follow NIST sanitization standards for government automobiles before resale, and should encourage NIST sanitization standards for automobiles before resale.
Motion (Moved / Seconded)	1. Approve ERs 3.3.6 and 3.3.9 as Category 2 and include both in the board's report (Ms. Reynolds / Mr. Caprio)
Objections / Amendments	• Mr. Bergman objected but said it could go forward
Result	1. ER3.3.6 and ER3.3.9 were approved with one objection recorded.

Discussion points:

- Mr. Bergman and Ms. Reynolds were asked if they were willing to amend the motion to make ER3.3.6 and ER3.3.9 as category 3.
  - Ms. Reynolds and Mr. Caprio asserted that these recommendations justified a category 2.
  - Mr. Chan had no issue with the recommendations only with the category rating. He suggested that category 3s aren't as important as category 2s and could be cut or moved to an appendix.
    - Ms. Cuthill clarified with Mr. Chan that a recommendation approved by the board, even a category 3, couldn't be removed without a subsequent vote for removal.
    - Mr. Chan concurred but repeated that category 3s might be presented differently (e.g., in an appendix rather than the report's main body).
  - The motion was approved.
    - Mr. Bergman registered an objection but did not request further discussion or modifications of the ERs and indicated these could go forward.

Theme: Establish Trust / Topic: Support Trusted Architectures

Recommendations	KR3.4, ER3.4.1, ER3.4.2, ER3.4.3, ER3.4.4, ER3.4.5
Recommendation Text	**KR3.4**: Support trusted architectures and conduct a limited pilot to assess the value of trusted digital threads for provenance and traceability across the supply chain. **ER3.4.1:** Incentivize multi-stakeholder alliances and collaboration for trusted end-to-end solutions across supply chains **ER3.4.2:** Support collaborative IoT platforms that align stakeholder business incentives **ER3.4.3**: Encourage the use of digital threads for connected supply chains **ER3.4.4:** Facilitate creation of business ecosystems that enable new business models and revenue streams

	ER3.4.5: Promote consistent levels of IoT device hardware and software identity documentation information included in trusted digital threads for software IoT supply chains
Motions (Moved / Seconded)	1. None
Objections / Amendments	● Wording concerns on the entire block
Result	1. KR3.4, ER3.4.1, ER3.4.2, ER3.4.3, ER3.4.4, and ER3.4.5 were moved to the parking lot.

Discussion Points:

- Mr. Bergman indicated there appeared to be a disconnect between the key recommendation and some of the enabling recommendation from a previous discussion.
- Mr. Katsioulas indicated that the work done here has evolved over time and was done a long time ago, but the key intent is to have the underlying recommendations (ERs 3.4.2 and 3.4.4) moved to the IoT economy.
  - He concurred with Mr. Bergman that the business ecosystems should not be here, but in the IoT economy.
- Mr. Bergman asked if there was a substitution of digital twins for digital thread?
  - Mr. Katsioulas indicated that no, the digital thread is the feedback loop between design and manufacturing.
  - Mr. Katsioulas pointed out that there is funding now by NIST and that the digital thread is a part of the core provenance.
- The board indicated that revised wording was needed as well as moving some of the enabling recommendations to a different theme.

Theme: IoT Ready Workforce

Recommendations	KR4.1, ER4.1.1, ER4.1.2, ER4.1.3
Recommendations Text	**Proposed new recommendations:** **KR4.1**: The federal government should integrate the needs of the future IoT workforce into existing initiatives and programs with industry, academia and state and local government efforts. **ER4.1.1:** The government should review the National cyber workforce development strategy and align and integrate any special or unique needs and considerations of the IoT workforce **ER4.1.2**: The federal government should create partnerships with industry, academia, and state and local government to create workforce around certain critical digital and non-digital skills, including cybersecurity, privacy, AI, data science, and systems integration, etc. **ER4.1.3:** The federal government should create partnerships with industry, academia, state and local governments and private investors to create workforce in industries that have traditionally not been digital, or have

	attracted significant digital talent (cities, industrial type industries like mining, construction, manufacturing, etc.) or in geographic areas that have struggled with recruiting people (rural areas, tribal lands, etc.). **Replacing original workforce recommendations in the pre-read draft:** ~~**KR4.1:** The government should invest in and promote IoT-related aspects of education and workforce.~~ ~~**ER4.1.1:** The government promote continuing education, professional development, and vocational training for IoT integration in supply chain management.~~ ~~**ER4.1.2:** The government should develop educational initiatives that include IoT, targeting workforce development, and enhancing business, government, and consumer data privacy and trust.~~ ~~**ER4.1.3:** Collaborate with industry, academia, state and local governments and private investors to create and place workforce in industries and areas of opportunity.~~
Motion (Moved / Seconded)	1. Move ***proposed*** KR4.1 and ER4.1.1, ER4.1.2 and ER4.1.3 be placed into the Parking Lot (Mr. Bergman / Ms. Rerecich)
Objections / Amendments	• Mr. Bergman objected to addressing these recommendations without more time to review and the motion was withdrawn to provide extra time for the IoT Advisory Board to review.
Result	1. Proposed KR4.1, ER4.1.1, ER4.1.2, and ER4.1.3 were moved to the Parking Lot

Discussion points:

- Mr. Chan reviewed the approach to IoT Ready Workforce shown in the agenda slide deck and his proposed revision to have four focus areas: bring workers in, workforce development, placement, and retention. He reviewed three proposed ERs and the associated rationale. He shared KR4.1 and associated content for the draft report.
- Mr. Chan indicated that the workforce recommendations were consolidated recommendations from different sets of recommendations developed during the advisory board process. The revised set was moved to the parking lot for later discussion due to the board receiving late notice of these recommendations.
- Discussion then centered on the new recommendations that were not in the draft pre-read report.
    - Ms. Cuthill confirmed these were provided as replacements on the morning of the board meeting and these would replace what was in the pre-read.
    - Mr. Witte stated that the pre-read recommendations were not as strong as these new submissions.
    - Mr. Chan displayed and discussed the four points of workforce development (sourcing/recruitment, education/development, placement, retention) and gave some supporting examples.
    - Mr. Bergman was concerned with moving into the report without an opportunity to review offline and Ms. Rerecich concurs.
    - Ms. Cuthill confirmed that it was appropriate to move these to the parking lot for consideration at the next meeting due to the late drafting of these recommendations.
- The workforce recommendations were moved to the parking lot.

- Mr. Witte took an ACTION to circulate the new workforce recommendations and supporting text for the board's review prior to the April meeting.

Theme: Facilitate Adoption / Topic: Funding Models

Recommendations	KR5.1, ER5.1.1, ER5.1.2, ER5.1.3
Recommendation Text	**KR5.1:** The government should consider new financial models for sustaining and supporting programs when considering IoT project feasibility. **ER5.1.1:** The government should encourage other financial or funding models to ~~help~~ select adopting organizations **to** sustain and support ~~in evaluating~~ IoT projects ~~feasibility~~. **ER5.1.2:** The government should consider "student loan forgiveness" programs in exchange for providing critical emerging technology (IoT, data science, cybersecurity, etc.) skills to municipalities and agencies. **ER5.1.3:** The government should consider developing programs and grants to allow underserved and less developed communities *to benefit from the adoption of IoT.*
Motions (Moved / Seconded)	1. Approve KR5.1 and Ers 5.1.1 and 5.1.3 as Category 2 to include in the board's report (Mr. Chan / Ms. Coughlin) with amendments
Objections / Amendments	• ER5.1.1 wording was revised • ER5.1.2 was moved to parking lot for considerations with workforce • ER5.1.3 was updated to include the wording 'to benefit from the adoption of IoT'
Result	1. ER 5.1, ER5.1.1 and ER5.1.3 were approved without objection. 2. ER5.1.2 was moved to the parking lot for consideration under the workforce theme.

Discussion points:

- On ER5.1.1:
  - Ms. Rerecich raised questions about the wording of ER5.1.1 and noted that it's a continuing project not a new initiative.
    - Mr. Chan pointed out the distinction is between project funding (which is non-sustaining) and program funding (which is typically sustainable). He also pointed out that projects are implemented but then shut down due to lack of continued supported funding.
  - Ms. Rerecich indicated then that's it not about evaluating feasibility, but about funding the program to continue.
    - Mr. Chan further clarified maybe evaluating agencies would put this as a criterion to consider sustaining and the government should look at other models. He made the point it's not always easy to sustain these programs unless there is an (ongoing) funding source.
    - Mr. Chan indicated that distribution is not always equitable and that many grants are more accessible to larger communities than smaller communities. He gave an example of public Wi-Fi.

- On ER5.1.2:
  - Mr. Chan indicated that ER5.1.2 may not match ER5.1.1 and asked if it should be placed here. He pointed out it originated from smart cities and sustainable infrastructure, said he thought the broader wording may be better, and asked if the board should move it.
  - Ms. Rerecich and Mr. Chan thought this ER belonged under workforce since workforce Ers reference tuition forgiveness.
  - The board agreed to move ER5.1.2 to the parking lot for consideration with other workforce recommendations.

Theme: Facilitate Adoption / Topic: Agriculture IoT Strategy

Note: ER5.2.2 was removed in an earlier version of the report.

Recommendations	KR5.2, ER5.2.1, ER5.2.3, ER5.2.4, ER5.2.5, ER5.2.6
Recommendation Text	**KR5.2**: The government should develop a comprehensive strategy for agricultural IoT. **ER5.2.1:** The government should consider fully funding the deployment of a "farm of the future" program at various universities. ~~Setup in every land grant university universities nationwide.~~ This nationwide test-farm IoT network should be representative of ~~should span~~ different forms of agriculture, including, but not limited to broadacre, horticulture, livestock, and aquaculture. **ER5.2.3:** The government should provide ensure that is sufficient overarching regulatory guidance for the drone industry. The Federal Government should also provide funding for the drone industry for additional research in order that existing technical obstacles can be overcome. **ER5.2.4:** The government should support and promote industry and SDO efforts to address interoperability of agricultural systems and machinery. **ER5.2.5:** The government should facilitate small farm/ranch adoption of IoT technologies. **ER5.2.6:** The government should support enactment of federal "right to repair" legislation to address the inability of agricultural producers to service their smart equipment.
Motions (Moved / Seconded)	1. Approve KR5.2 as Category 1 and Ers 5.2.4 and 5.2.5 as Category 2 to include in the report (Dr. Chandra / Mr. Griffith) 2. Approve ER5.2.6 as Category 2 to include in the report (Dr. Chandra / Mr. Emanuel)
Objections / Amendments	• ER5.2.1 moved to the parking lot with amendments • ER5.2.3 which focuses on drones in agriculture was moved to the parking lot pending broader wording
Result	1. KR5.2, ER5.2.4, ER5.2.5 and ER5.2.6 were approved without objection. 2. ER5.2.1 and ER5.2.3 were moved to the parking lot.

Discussion points:

On ER5.2.1 (land grant universities):

- Mr. Bergman questioned the feasibility of creating "farms of the future" at more than 100 land grant universities and suggested a pilot program at a subset. Dr. Chandra indicated that while not every land grant university needs to be included, a pilot program should include a sufficient mix of regions and crops. This supports both students at the universities and farmers in the region through extension programs.
- Mr. Bergman further inquired about why land grant universities.
    - Dr. Chandra pointed out they are the ones with the advisory systems and extension agencies for agriculture.
    - Dr. Chandra indicated that every land grant university has associated farmland.
    - Mr. Caprio agreed with Mr. Bergman's questioning and suggested a pilot at one university in government where can start small and scale up.
    - Dr. Chandra indicated the National Science Foundation is funding projects at universities and the goal here is to take it to the next level and think about 'farm of the future' rather than just a pilot.
- Mr. Bergman asked to move it to the parking lot given some objections
    - He indicated there was not enough time for a discussion of the objectives but gave some perspective, including questions on is it a grant program, is there a centralized goal or is there sharing of knowledge back and forth between universities?
    - He indicated there are challenges of administration with hundreds of projects.
- Ms. Cuthill asked for Dr. Chandra or Mr. Emanuel to provide alternative wording that would address the concerns and Dr. Chandra and Mr. Emanuel agreed.

On ER5.2.3 (drones for agricultural use):

- Mr. Witte indicated the IoT Federal Working (IoTFWG) group commented that there is already regulatory guidance for the drone industry.
    - Mr. Bergman pointed out this was to preempt state regulations.
    - Mr. Witte suggested adjusting the wording to acknowledge that the existing guidance could be improved.
    - Mr. Griffith and Mr. Witte suggested word choices to consolidate the recommendation.
    - Ms. Rerecich asked if the placement should be a more general recommendation than specific to agriculture?
        - Dr. Chandra agreed with Ms. Rerecich.
    - Mr. Chan noted that the problem is restrictions on how drones can be used and the need for waivers to exceed regulatory constraints (e.g., line-of-sight requirements and one operator per drone may not make sense in low traffic farming situation). Addressing general questions about drone operation is broad enough to move to the Government Leadership theme.
    - The board agreed and moved ER5.2.3 to the parking lot with the goal of a broader recommendation regarding drones.

On ER5.2.6 (right to repair):

- Discussion on whether ER5.2.6 should be limited to right-to-repair as applied to agricultural equipment or if it needs to be addressed as a broader topic:

- Mr. Caprio and Ms. Rerecich indicated it's much broader than just agriculture.
- Mr. Emanuel pointed out there is current agriculture-focused legislation but it is not clear on terms and thought the discussion last month agreed to focus on agriculture specifically.
  - Dr. Chandra agreed with Mr. Emanuel.
- Mr. Chan pointed out that in agriculture specifically, the right to repair issue is hindering IoT adoption.
  - He gave the example of smart tractors out of service at inopportune times.
- Ms. Rerecich suggested adding an impeding adoption aspect to the discussion.
- ER5.2.6 was approved without objection.

Theme: Facilitate Adoption / Topic: Facilitate IoT in Smart Cities

Recommendations	KR5.3, ER5.3.1, ER5.3.2, ER5.3.3, ER5.3.3A, ER5.3.4, ER5.3.5, ER5.3.6
Recommendation Text	**KR5.3**: The government should implement specific actions to further promote IoT adoption through smart ~~cities~~ communities. **ER5.3.1:** The government should facilitate and support the development and use of smart community ~~city~~ and *"IoT-related sustainable infrastructure"* reference models. **ER5.3.2:** The government should consider the development of Smart Community ~~City~~ and Sustainability Extension Partnerships (SCSEP). **ER5.3.3:** The government should facilitate opportunities for adoption and equity of benefits of IoT and smart city technologies for local communities. ~~Governments (cities, counties), regional entities (water districts, sanitation districts, air quality districts, etc.) and utility companies.~~ **ER5.3.3A:** The government should facilitate smart community opportunities and adoption of IoT for those rural communities that have broadband infrastructure, have received broadband infrastructure funding or have completed broadband infrastructure build-outs. **ER5.3.4**: The government should support and promote industry and SDO efforts to address interoperability of smart communities ~~cities~~ (including smart buildings, energy and utilities, traffic) **ER5.3.5:** The government should facilitate small to medium city adoption of smart ~~city~~ community technologies**.** **ER5.3.6:** The government should facilitate equity in realization of smart ~~city~~ community benefits.
Motions (Moved / Seconded)	1. Approve KR5.3 and Ers 5.3.1 – 5.3.6 as Category 2 and include all in the board's report (Mr. Chan / Mr. Griffith)
Objections / Amendments	● KR5.3, and Ers 5.3.1, 5.3.2, 5.3.3, 5.3.4, 5.3.5, and 5.3.6 amended to remove 'cities' and replace with 'communities'. ● ER5.3.1 was amended to add an explicit reference to IoT. ● ER5.3.3 was amended to remove additional language.
Result	1. KR5.3, ER5.3.1, ER5.2.3, ER5.3.3, ER5.3.3A, ER5.3.4, ER5.3.5 and ER5.3.6 were approved without objection.

Discussion Points:

- Ms. Rerecich questioned why the term 'sustainability'.
  - Mr. Chan pointed out the legislation called out for sustainable infrastructure and sustainability applies to smart cities / smart communities.
  - Mr. Chan suggested perhaps changing the wording to be more encompassing as communities instead of smart cities.
  - Ms. Rerecich pointed out that 5.3.1 doesn't make any reference to IoT. The board agreed to adjust wording.
- Mr. Chan indicated some of this is more forward thinking.
  - As an example, communities buy different things and the interoperability isn't there at some point in the future. Reference architecture models shed light on the need for design for integration, data sharing, and scaling operations.
  - Mr. Chan pointed out this could be similar to the Cybersecurity Framework for smart cities. IoT is a part of sustainable infrastructure.
  - Ms. Rerecich pointed out then a smart city is by definition IoT, but sustainability is not. So we may need to say that somehow.
- Ms. Cuthill asked if there are any changes that need to be made or moved to the parking lot?
  - Mr. Chan called to change 'local governments / cities' to 'communities' to be more encompassing.
  - Board agreed on the text change from "smart cities" to "smart communities" throughout the recommendations.
  - Text changes were made at that point and it was not necessary to move the recommendations to the parking lot.

Theme: Facilitate Adoption / Topic: Facilitate IoT in Public Safety

Recommendations	KR5.4, ER5.4.1, ER5.4.2, ER5.4.3, ER5.4.4
Recommendation Text	**KR5.4:** The government should implement specific actions to promote IoT adoption that will improve public safety. **ER5.4.1:** The government should create a stockpile of public safety IoT devices that is available for immediate access. **ER5.4.2:** For public safety and smart city projects supported by federal grants that utilize IoT technologies (such as cameras, plate readers, and other applications that may be used to identify people), the grantor agencies should include a provision specifying the need for the awardees to develop privacy and data usage policies in collaboration with the communities that they serve as part of the deployment. **ER5.4.3:** Federal RFPs/RFIs that support public safety applications should include a requirement for bidders to consider how IoT can be incorporated into it, as well as to include an IoT user adoption and utilization plan as part of the evaluation process. **ER5.4.4:** The federal government should create a program that enables local communities to purchase IoT systems or IoT enabled systems for public safety

	applications. This includes systems that support law enforcement, fire, emergency management services, and public safety access points.
Motions (Moved / Seconded)	1. Approve KR5.4 and Ers 5.4.2, 5.4.3, and 5.4.4 as Category 2 to include in the board's report (Mr. Chan / Ms. Rerecich)
Objections / Amendments	● ER5.4.1 was moved to Parking Lot
Result	1. KR5.4, ER5.4.2, ER5.4.3 and ER5.4.4 were approved. 2. ER5.4.1 was moved to the parking lot.

Discussion Points:

- ER5.4.1 was moved to the parking lot due to concerns about the wording and to provide an opportunity to revise the recommendation.
- Mr. Chan described the Ers 5.4.2-5.4.4:
  - ER5.4.2 was developed, in part, from expert contribution from a previous speaker, Mr. Chris Moore, that facial recognition systems are helpful to law enforcement but there are concerns that these technologies can be abused. Communities sometimes ban these technologies as a result. Mr. Chan indicated this showed the need for the development of policies on data privacy and usage so that there is transparency on the use of technologies.
  - ER5.4.4 is an alternative to the recommendation for a national stockpile. Having a stockpile at the national level is not practical for some of the same reasons the IoTFWG called out. This recommendation leverages existing grant vehicles and programs to include IoT technologies for public safety.

Theme: IoT Adoption / Topic: IoT in Health Care

Recommendations	KR5.5, ER5.5.1, ER5.5.2, ER5.5.3, ER5.5.4, ER5.5.5
Recommendation Text (including amendments)	**KR5.5:** The government should implement specific actions to promote IoT adoption in the health care industry. **ER5.5.1:** The government should promote IoMT as an enterprise priority, including to healthcare facilities' leadership teams. **ER5.5.2:** Facilitate cybersecurity in IoT in smart medical devices and equipment, including wearables, in-home devices, community *IoT-related healthcare* ~~IoMT~~ systems, and a continuum of care. **ER5.5.3:** Facilitate and support the use and adoption of healthcare IoT in rural communities. **ER5.5.4:** Facilitate the adoption of AI in IoT in healthcare through improved AI research, development, and workforce improvement. **ER5.5.5:** The government should enact HIPAA-like protection for users' medical data in mobile applications and IoT devices.
Motions (Moved / Seconded)	1. Rate KR5.5 and Ers 5.5.1, 5.5.2, 5.5.3, 5.5.4, and 5.5.5 as Category 2 and include in the report (Ms. Rerecich / Ms. Reynolds)
Objections / Amendments	● ER5.5.2 was edited to change "community IoMT systems" to "community IoT-related healthcare systems".

Results	1. KR5.5, ER5.5.1, ER5.5.2, ER5.5.3, ER5.5.4 and ER5.5.5 were approved without objection.

Discussion Points:

- Mr. Chan noted, regarding ER5.5.2, that "smart medical devices and equipment" are regulated by the FDA and suggested "IoT in healthcare" as appropriate wording.
    - The board adopted revised wording, changing "community IoMT systems" to "community IoT-related healthcare systems" to avoid conflict with FDA authorities.

Theme: Facilitate Adoption / Topic: Facilitate IoT in Sustainability and Environmental Monitoring

Recommendations	KR5.6, ER5.6.1, ER5.6.2, ER5.6.3, ER5.6.4, ER5.6.5
Recommendation Text	**KR5.6:** The government should implement specific actions to promote IoT adoption that will improve sustainability and environmental monitoring. **ER5.6.1.:** The government should support development of IoT environmental data repositories to better enable open and available data. **ER5.6.2:** The government should facilitate and support the research, development and deployment of low cost Air Quality sensors. **ER5.6.3:** The government should implement a nationwide IoT-based Water Monitoring Infrastructure to expand the nationwide water monitoring system, including water treatment facilities**.** **ER5.6.4:** The government should utilize IoT Technologies to facilitate carbon transparency across economic sectors. **ER5.6.5:** The government should facilitate and promote the use and integration of IoT technologies to complement and support wide area environmental situational awareness capabilities to monitor and inform on a variety of environmental conditions and hazards in environmentally sensitive areas.
Motions (Moved / Seconded)	1. Approve KR5.6 and Ers 5.6.2, 5.6.3, 5.6.4, and 5.6.5 as Category 2 to include in the board's report without amendments (Mr. Griffith / Ms. Rerecich)
Objections / Amendments	● ER5.6.1 was moved to the parking lot to incorporate responses to comments from the IoTFWG
Result	1. KR5.6, ER5.6.2, ER5.6.3, ER5.6.4, and ER5.6.5 were approved without objection. 2. ER5.6.1 was moved to the parking lot.

Discussion Points: None

Theme: Facilitate Adoption / Topic: Facilitate IoT in Smart Transit and Transportation

Recommendations	KR5.7, ER5.7.1
Recommendation Text	**KR5.7:** The government should implement specific actions to promote IoT adoption in Smart Transit and Transportation**.** **ER5.7.1:** The government should promote the development and adoption of policies, procedures and funding methods that can accelerate the adoption of smart, connected, and electrified transportation technologies.
Motions (Moved / Seconded)	1. Approve KR5.7 and ER. 5.7.1 as Category 2 and include in the board's report (Mr. Griffith / Mr. Chan)
Objections / Amendments	None
Result	1. KR5.7 and ER5.7.1 were approved without objection.

Discussion Points:

- Mr. Chan asked Mr. Griffith about the context of 5.7 and 5.7.1.
  - Mr. Griffith started with electrified transportations and broadened it to include other types of transportation.
  - Mr. Griffith indicated that several original recommendations were merged into this one.
  - Mr. Witte indicated the specific call to action on the current version.
- Mr. Griffith indicated this also talks about spurring private investment as well.
- Mr. Chan reviewed the text again and commented the language is broad, but as long as there are specific actions on them.

Theme: IoT Economy / Topic: IoT Supply Chain Operations

Recommendations	KR6.1
Recommendation Text (including amendments)	**KR6.1:** The government should monitor and evaluate progress of IoT adoption for supply chain logistics.
Motions (Moved / Seconded)	1. Rate KR6. 1 as Category 1 and include in the report. (Mr. Katsioulas / Mr. Griffith)
Objections / Amendments	● None
Results	1. KR6.1 was approved without objections.

Discussion Points:

- Mr. Caprio asked if there was a proposed metric to monitor the adoption of IoT for supply chain logistics.
  - Mr. Witte described the recommendation as a call to develop a metric.
  - Mr. Chan noted that the "iot.gov" concept was intended to assist with reporting on IoT adoption progress.
- Mr. Chan noted there was a comment from the IoTFWG that supply chain logistics was under-represented in the draft report.

Theme: IoT Economy / Topic: Public-Private Partnerships

Recommendations	KR6.2, ER6.2.1, ER6.2.2, ER6.2.3
Recommendation Text (including amendments)	**KR6.2:** The government should help establish and foster public-private partnerships (PPPs) focused on IoT adoption to facilitate collaboration and knowledge sharing between government agencies, businesses, technology providers, and academia. **ER6.2.1:** The government should foster orchestrated Public-Private Partnerships (PPPs) promoting network effects among connected enterprises and across supply chains. **ER6.2.2:** The government should subsidize initiatives for digital infrastructure supporting the digital transformation of enterprise business processes including design, production, procurement, and distribution. **ER6.2.3:** The government should promote the enablement and use of trusted digital threads, trusted digital marketplaces and platform-based business ecosystems.
Motions (Moved / Seconded)	1. None
Objections /Amendments	● Inconsistency of focus among the KR and Ers.
Results	1. KR6.2, ER6.2.1, ER6.2.2, and ER6.2.3 were moved to the parking lot.

Discussion Points:

- Mr. Caprio described ER6.2.2 as a "big recommendation" and asked for greater clarity about goals and success criteria. He noted that the Ers speak to subsidizing initiatives and asked for more specificity about the level of subsidy and the specific initiatives.
  - Mr. Katsioulas shared business analysis describing how the lack of digitalization and supporting infrastructure is holding back IoT adoption. Mr. Chan concurred, noting examples in the insurance, retail, and healthcare sectors, adding that this transformation can be a "big lift" especially for small businesses.
  - Mr. Chan described KR6.2 and ER6.2.2 as "foundational" and acknowledge that ER6.2.1 and ER6.2.3 may need further discussion.
  - Mr. Bergman disagreed regarding ER6.2.2, with questions about how the program would be monitored to be about IoT, how subsidies would be routed, and how appropriate businesses would be identified.
    - Mr. Katsioulas replied that a business being focused on producing or using IoT would be an essential characteristic.
  - Mr. Chan moved all three Ers to the parking lot.
- Mr. Bergman pointed out that KR6.2 focuses on PPPs whereas the Ers have a different focus, and asked if the KR should be broadened. KR6.2 was moved to the parking lot.

Theme: IoT Economy / Topic: Supply Chain Architecture

Recommendations	KR6.3, ER6.3.1
Recommendation Text (including amendments)	**KR6.3:** The government should actively promote and support the adoption of AI application to improve decision making, optimize resource utilization, and enhance productivity. **ER6.3.1:** The government should promote trusted AI-IoT platforms across circular supply chains and ecosystems to improve transparency and sustainability and drive economic growth.
Motions (Moved / Seconded)	1. None
Objections /Amendments	● Concerns regarding including AI-oriented recommendations in the report.
Results	1. KR6.3 and ER6.3.1 were moved to the parking lot.

Discussion Points:

- Mr. Katsioulas describe the evolution of AI as being so rapid that the government will be unable to react. He also described this as a top item in international collaboration. He noted that the EU is moving rapidly to define policies for AI.
  - Ms. Reynolds supported the view of rapid evolution, noting there are AI developments reported every month.
  - Multiple board members expressed concerns regarding putting forward recommendations in this area.
  - Mr. Chan moved KR6.3 and ER6.3.1 to the parking lot.

Theme: IoT Economy / Topic: Domestic IoT Manufacturing Supply Chain

Recommendations	KR6.A (AKA Recommendation 9)
Recommendation Text (including amendments)	**KR6.A:** The federal government should select the most appropriate mix of policies, incentives, and requirements to support sustainable and scalable growth in the domestic IoT manufacturing supply chain.
Motions (Moved / Seconded)	1. None
Objections / Amendments	● Uncertainty where this item should fit in the report's structure.
Results	1. KR6.A was moved to the parking lot.

Discussion Points:

- Mr. Griffith noted that the proposed KR was originally in the supply chain group, but he was uncertain where it belongs in the current report structure.
  - Mr. Witte noted that currently there is no supporting text or Ers for this KR.
  - Mr. Bergman expressed concern over the phrase "appropriate mix".
  - Mr. Griffith stated he had targeted suggestions to support that. He said he could supply supporting text for this recommendation.
  - Mr. Chan moved this to the parking lot pending the availability of more complete content.

- Mr. Chan asked if a recommendation is needed focused on the domestic use of IoT, including concerns about Chinese model vendors.
    - Mr. Bergman noted that Congress is already addressing this issue. He stated the board could recommend banning Chinese products outright but should develop a more thoughtful recommendation to promote domestic IoT production.
    - Mr. Caprio concurred with Mr. Bergman's view.
    - Mr. Bergman noted that the board's mandate is promoting the growth of IoT, and that blocking the importation of modules could have effect contrary to that.
    - Mr. Katsioulas agreed that bans and blocks aren't effective and advocated for the ability to monitor and trace imported products.
    - Mr. Chan suggested this topic could be acknowledged as a finding, rather than a recommendation.

This concluded the initial review of all the recommendations.

Pass Two: Address Items in Parking Lot

Ms. Cuthill announced that the first pass was complete, and Mr. Witte reported 34 recommendations remained in the parking lot. Ms. Cuthill suggested a process which Mr. Chan accepted:

- Plan for an additional (May) board meeting to allow time for rework of those parking lot recommendations that need extensive writing / rewriting;
- Identify and address the subset of parking lot actions that can be dealt with during this meeting;
- Assign action items to address changes required for all remaining parking lot items.

Theme: Government Leadership / Topic: Strategic Approach for IoT

Recommendations	ER1.1.1, ER1.1.2
Recommendation Text	**ER1.1.1** IoT ~~must~~ should be added back to the critical and emerging technology list. **ER1.1.2** Congress *and the Executive Branch* should further improve and elevate inter-agency coordination.
Motions (Moved / Seconded)	1. Approve ER1.1.1 and ER1.1.2 as Category 1 to include in the Board's Report (Mr. Caprio / Ms. Reynolds)
Objections / Amendments	● ER1.1.1 amended to say "should" in place of "must" ● ER1.1.2 amended to include 'and the Executive Branch'
Result	1. ER1.1.1 and ER1.1.2 were approved without objection.

Discussion Points:

- On ER1.1.1: Mr. Caprio indicated a good suggestion from the IoTFWG: change "must" to 'should' and it makes it consistent with other recommendations.
- On ER1.1.2: Concerns were regarding directing the recommendation to Congress.
  - Mr. Caprio pointed out the intent was creating a national coordinating office, which takes congressional action. If the national coordinating office isn't there, then Congress and the Executive Branch should work together.
  - Mr. Caprio suggested the wording needs to be consistent regardless of the terms and that government sounded amorphous. Believes it should say Congress and the Executive Branch.
- Following discussion of both ER1.1.1 and ER1.1.2, the motion to adopt both were approved without objections.

Theme: Government Leadership / Topic: Federal Government Activities

Recommendations	ER1.1.4
Recommendation Text (including amendments)	**ER1.1.4:** The government should consider upgrading legacy federal owned or operated ~~buildings~~ *assets* that have inadequate security in their connected systems.
Motions (Moved / Seconded)	1. Rate ER1.1.4 a Category 2 and include in the report. (Mr. Griffith / Mr. Bergman)

Objections / Amendments	● ER1.1.4 was amended to change "buildings" to "assets"
Results	1. ER1.1.4 was approved without objection.

Discussion Points:

- Mr. Chan stated the intent for ER1.1.4 was to either broaden it from its cybersecurity origins or create a parallel recommendation to address non-cybersecurity aspects. He recommended broadening the existing ER.
  - Mr. Bergman asserted that ER1.1.4 was targeted and should not be changed. He said a new, parallel recommendation was acceptable but suggested avoiding new recommendations unless "urgently needed". He asked for clarity on the specific focus of an expanded recommendation.
  - Mr. Chan took an ACTION to draft a parallel recommendation for the board's consideration.

Theme: Modernize Infrastructure / Topic: Data Sharing

Recommendations	KR2.1, ER2.1.1, ER2.1.2, ER2.1.3
Recommendation Text	**KR2.1:** The government should foster policies that encourage responsible and equitable sharing of IoT data and thereby drive economic growth, social benefits, and sustainability. **ER2.1.1:** The government should establish templates or best practices for clear and robust corporate policies regarding data sharing, usage, and licensing among parties in the IoT ecosystem. **ER2.1.2:** The government should partner with industry and collaborate with international allies to develop and support comprehensive data sharing policies that stimulate economic growth, social benefits, and sustainability. **ER2.1.3:** The government should establish data repositories for privately collected data.
Motions (Moved / Seconded)	1. Remove ER2.1.3 from consideration. (Mr. Bergman / Mr. Caprio) 2. Remove the entire block from the report. (Ms. Reynolds / Mr. Griffith)
Objections / Amendments	● None
Result	1. KR2.1, ER2.1.1, ER2.1.2 and ER2.1.3 were rejected and removed from the report.

Discussion Points:

- Mr. Witte reminded the board these recommendations are in the parking lot due to concerns over data sharing and data repositories.
  - Mr. Bergman stated he was not prepared to include data repositories for privately collected data at all. Ms. Reynolds and Mr. Caprio concurred with this position.
- The board decided to remove the entire block from the report, based on the above concerns.

Theme: Modernize Infrastructure / Topic: Interoperability

Recommendations	KR2.2, ER2.2.1, ER2.2.2, ER2.2.3
Recommendation Text	**KR2.2:** The government should establish methods to foster interoperability for technology, including through the use of consistent models, protocols, application, interfaces and schemas. **ER2.2.1:** The government should work with various organizations to facilitate interoperability through the development of a consistent data taxonomy for the sharing and exchange of data collected from IoT and non-IoT sources. **ER2.2.2:** The government should support research and industry-led standards in areas such as telematics and sensor technologies for automated vehicles. **ER2.2.3:** The government should promote and adopt industry led standards, guidelines and protocols for minimum baseline interoperability for smart transportation technologies and corresponding transportation infrastructure (i.e., sensors in roads, cameras at intersections).
Motions (Moved / Seconded)	1. Restructure KR2.2 and its associated ERs to address a broader range of approaches for government to foster interoperability. (Mr. Chan / Mr. Griffith)
Objections / Amendments	● Mr. Griffith took an action to restructure this content.
Result	1. KR2.2, ER2.2.1, ER2.2.2 and ER2.2.3 were kept in the parking lot pending restructuring to address a broader range of approaches.

Discussion Points:

- Mr. Witte noted these are the only recommendations focused on interoperability.
- Ms. Reynolds stated that interoperability needs to be in the report.
  - Mr. Witte pointed out that there is a finding on this topic.
  - Mr. Chan raised a concern about having a finding without any associated recommendations and gave several examples of feasible government actions to foster interoperability.
- Mr. Griffith stated that these recommendations had originated from the transportation work.
- Mr. Griffith took an ACTION to implement the approved motion to restructure this block.

Theme: Establish Trust / Topic: Development of Data and Privacy Policy Framework

Recommendations	ER3.3.7
Recommendation Text	**ER3.3.7:** The government should add "Location Tracking Enabled" notice*s for* ~~to U.S. E-Labeled~~ IoT devices.
Motions (Moved / Seconded)	1. None.
Objections / Amendments	● Ms. Reynolds took an action to research the history of ER3.3.7
Result	1. ER3.3.7 remained in the parking lot.

Discussion Points:

- Ms. Cuthill clarified that ER3.3.7 had been placed in the parking lot due to uncertainty regarding the term "E-Labeled".
  - Ms. Reynolds concurred and noted it would be desirable, but not required, to link ER3.3.7 to an existing program.
  - Mr. Bergman stated that CTA is researching programs that could be cited but does not yet have any recommendation.
  - Ms. Rerecich added that the critical need is to provide notification of location tracking to IoT users.
  - A rewording was proposed, striking the words "to U.S. E-Labeled" and adjusting the remaining wording.
  - Mr. Bergman and others objected noting that the proposal is not connected to any regulatory authority or legislative action and its implementation is undefined. Mr. Bergman asserted that the recommendation should not be included without a clear concept of how it would work.
  - Ms. Reynolds took an ACTION to research the history of ER3.3.7; the recommendation will remain in the parking lot.

Theme: Facilitate Adoption / Topic: Agriculture IoT Strategy

Recommendations	ER5.2.1
Recommendation Text (including amendments)	**ER5.2.1:** The government should consider fully funding the deployment of a "farm of the future" *program at various universities*. ~~setup in every land grant university *universities* nationwide.~~ This nationwide test-farm IoT network *should be representative* ~~should span~~ of different forms of agriculture, including, but not limited to broadacre, horticulture, livestock, and aquaculture.
Motions (Moved / Seconded)	1. Rank ER5.2.1 (as amended) as Category 1 and include in the report (Dr. Chandra / Mr. Bergman)
Objections / Amendments	● ER5.2.1 was reworded to allow greater flexibility regarding its scope.
Results	1. ER5.2.1 was approved without objection.

Discussion Points:

- Mr. Bergman reported that there are approximately 106 land grant universities (LGUs), plus other non-land grand universities with farmlands. He expressed concern over the scope of the recommendation and its focus on LGUs and advocated for a more limited approach in selected regions with selected crops.
  - Dr. Chandra acknowledged that including all LGUs is unnecessary and suggested that LGUs and other universities could apply for grants as groups. He said the focus on LGUs was due to the presence at most LGUs of "USDA extension centers that farmers trust", saying that touchpoint with farmers is important. He described the goal as to showcase to farmers the types of IoT applications and how they can be used in order to help bridge the adoption problem of agricultural IoT.
- Mr. Bergman and Dr. Chandra negotiated revised wording which was accepted by the board.

Wrap-Up

The board members reviewed the recommendations remaining in the parking lot to assign responsibilities.

- ER5.2.3 (Drones) – Mr. Griffith will review and revise as needed.
- ER5.4.1 (Stockpiles) – Ms. Mehra and Ms. Coughlin will review and revise as needed.
- ER5.6.1 (Environmental Data Repositories) – Will remain in the parking lot.
- KR3.4 and ERs 3.4.1 through 3.4.5 (Supply Chain Traceability) – Mr. Katsioulas, Mr. Chan, and Mr. Witte will review and revised as needed.
- KR6.2 and ERs 6.2.1 through 6.2.3 (PPPs) – Mr. Katsioulas, Mr. Chan, and Mr. Witte will review and revised as needed.
- KR6.3 and ER6.3.1 (AI) – Mr. Chan, Mr. Griffith, and Mr. Witte will review and revise as needed. Mr. Chan noted that the goal was to make these recommendations broader.
- KR6.A / Recommendation 9 (Domestic IoT manufacturing supply chain) – Mr. Witte will provide the text for discussion at the next meeting and review other supply chain enabling recommendations that should be restored to the report.

Close Meeting

Mr. Chan thanked the board members for persevering through the long meeting.

Ms. Cuthill thanked the board members for their efforts and adjourned the meeting.