Roadmap to AI/ML at the FAA

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- **Finding: Detail Phased Roadmap for Artificial Intelligence (AI) and Machine Learning (ML) -** The Subcommittee on Aircraft Safety appreciates the response from the FAA regarding our recommendation from our Spring 2022 meeting regarding the need for industry to have a published phased roadmap for AI/ML regulatory guidance from the FAA. The Subcommittee on Aircraft Safety further appreciates the efforts in which FAA is working with NASA to develop an Autonomy V&V Vision 2045, with an associated roadmap.

  However, the Subcommittee on Aircraft Safety views AI/ML as a different portfolio of technologies than autonomy technologies. While AI/ML technologies can be used for autonomous operations, it is also possible to use more traditional technologies such as deterministic systems for autonomous operations. Furthermore, AI/ML can be used for applications other than autonomy, such as providing advisory information to a flight crew, which is unrelated to autonomous operation of the air vehicle. Industry is reluctant to introduce AI/ML technologies into new products due to the current certification uncertainties.

  The Subcommittee on Aircraft Safety re-emphasizes the importance of developing this roadmap with enough details to ensure it adequately informs industry on the sequence in which the FAA plans to release regulatory guidance on methods and procedures to (1) certify systems of various safety criticalities, (2) certify AI/ML based on various types and sources of AI/ML training and testing data, and (3) procedures for updating AI/ML models in previously certified systems based on updated training and test data sets. Other regulators have issued such a roadmap. However, they have been vague, ambiguous, and not useful to the industry in supporting their business models.

- **Recommendation : -**Given the speed at which demands for AI/ML technologies are being developed, the REDAC Subcommittee on Aircraft Safety reiterates its previous recommendation for the FAA to expeditiously prepare and published a detailed phased roadmap for AI/ML research and development required to formulate AI/ML regulatory guidance, taking into account the FAA safety continuum and use case to accelerate deployment for lower risk aviation applications.

Agenda

- Introduction
- Background: Technology Assessment
- Goals
- Scope of Current Year 2023
- Methodology
- Work Breakdown Structure
- Schedule
- Supporting Research

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  - a *roadmap* is normally accompanied by a *technical guidance* to explain how to do certain tasks toward achieving a milestone (in that roadmap)
  - **a *technical guidance* is supported by *R&D work* that provides the core specific procedure/instruction for the implementation**

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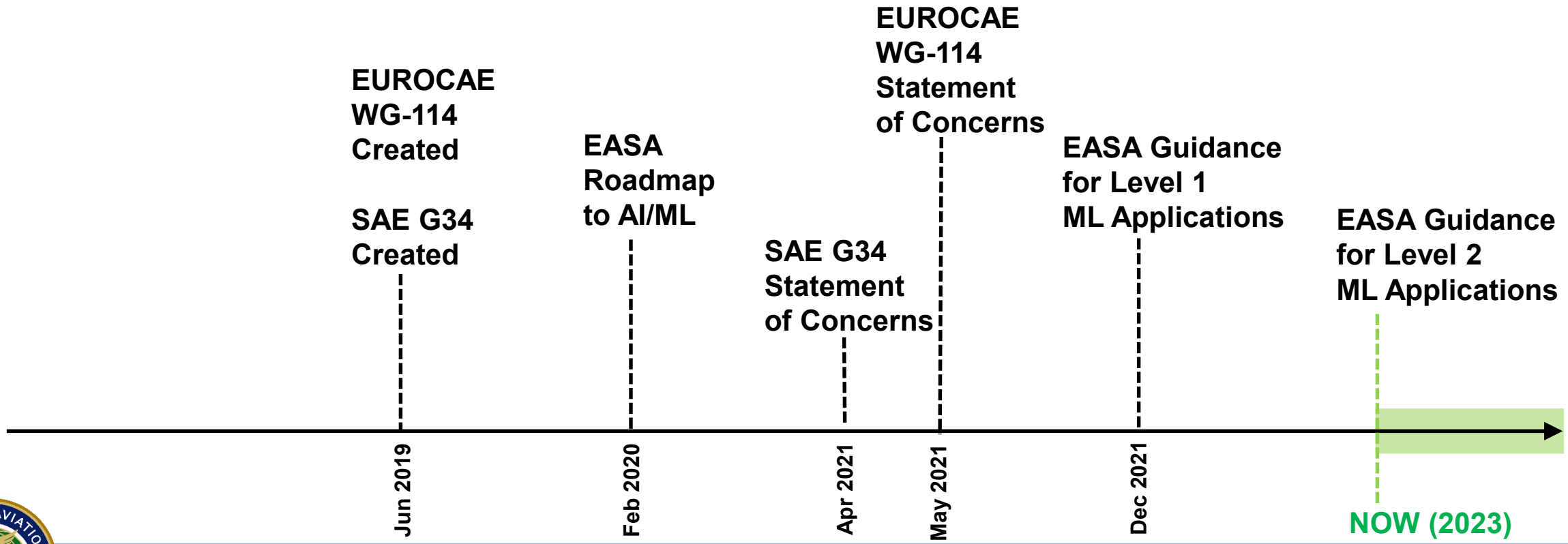
    - **disadvantage: *difficult* to verify and validate (for certification)**

Background: Technology Assessment

- **Historical timeline**



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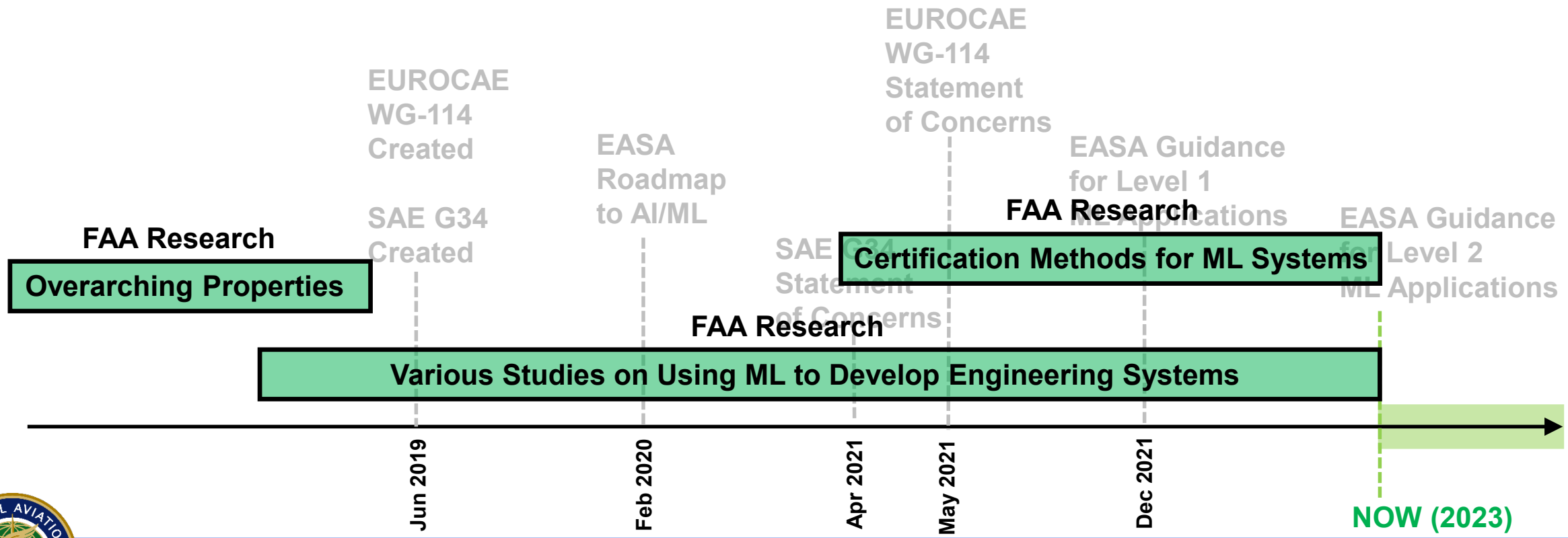

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    - **should leverage the FAA's safety continuum**

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  - **focusing on short-term goal allows feasible final deliverable product while gaining more insights on how to accomplish long-term goal**

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    - **OP 3: safety acceptability**

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  - **seeking FAA approval**

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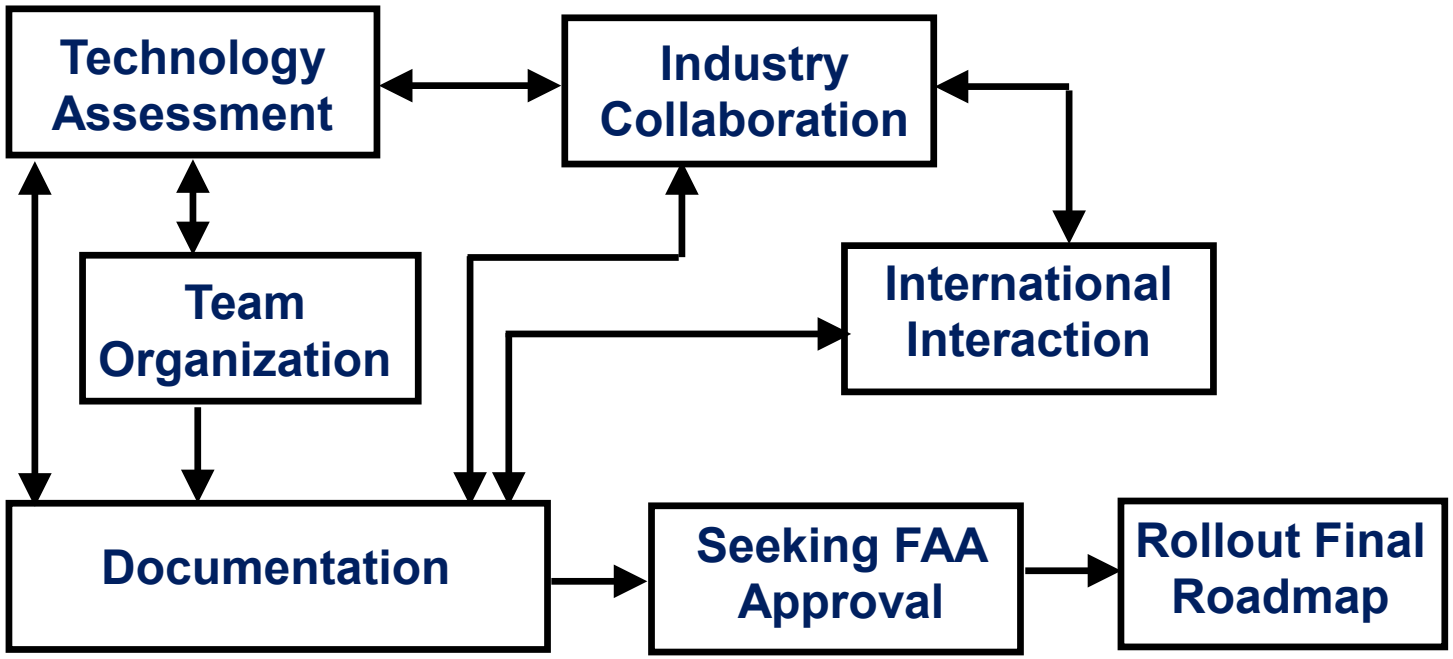
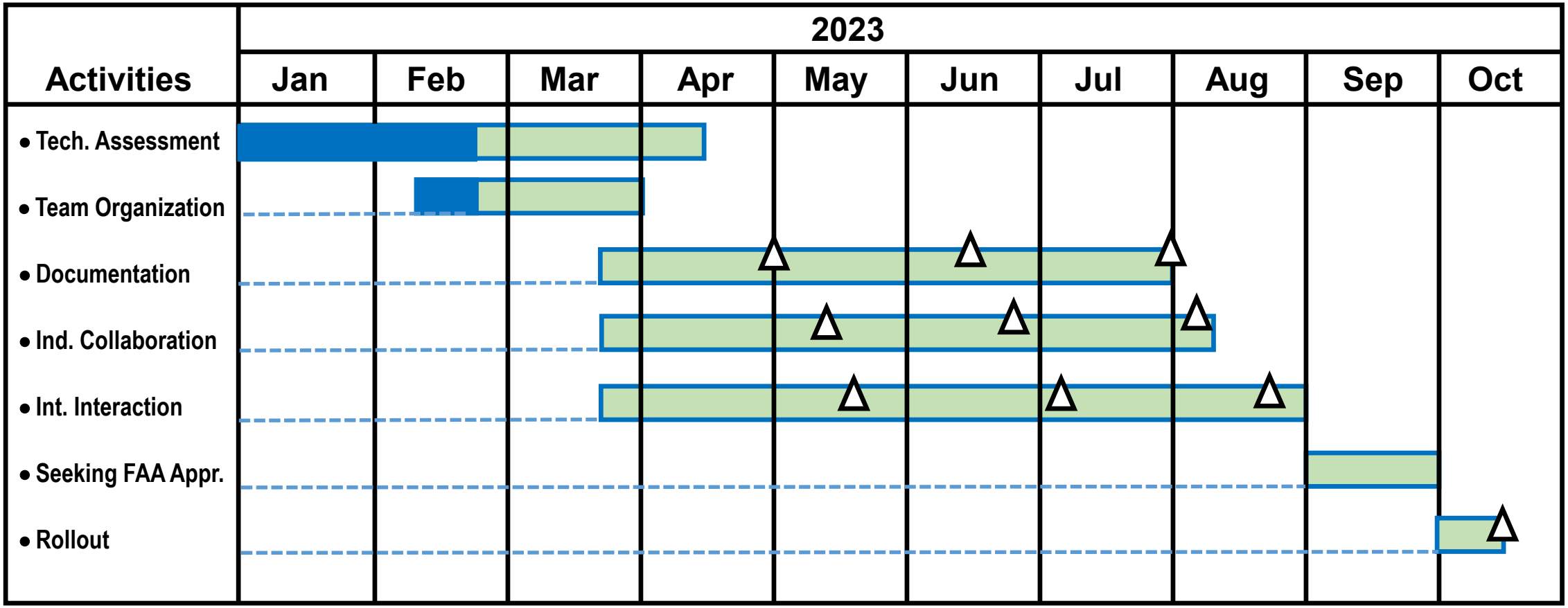
  - technology assessment
  - team organization
  - documentation
  - interaction with international regulation authorities
  - collaboration with industries and research communities
  - seeking FAA approval
  - **rollout final roadmap**

Work Breakdown Structure

Initial Inputs	Activities	Final Output
• FAA Overarching Properties Report • EASA Roadmap • EASA Tech Guidance Levels 1 and 2		• FAA Roadmap to AI / ML

Schedule


2023
Activities
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
• Tech. Assessment
• Team Organization
• Documentation
• Ind. Collaboration
• Int. Interaction
• Seeking FAA Appr.
• Rollout

Supporting Research

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  - **specific levels of safety will be identified and defined in the roadmap**

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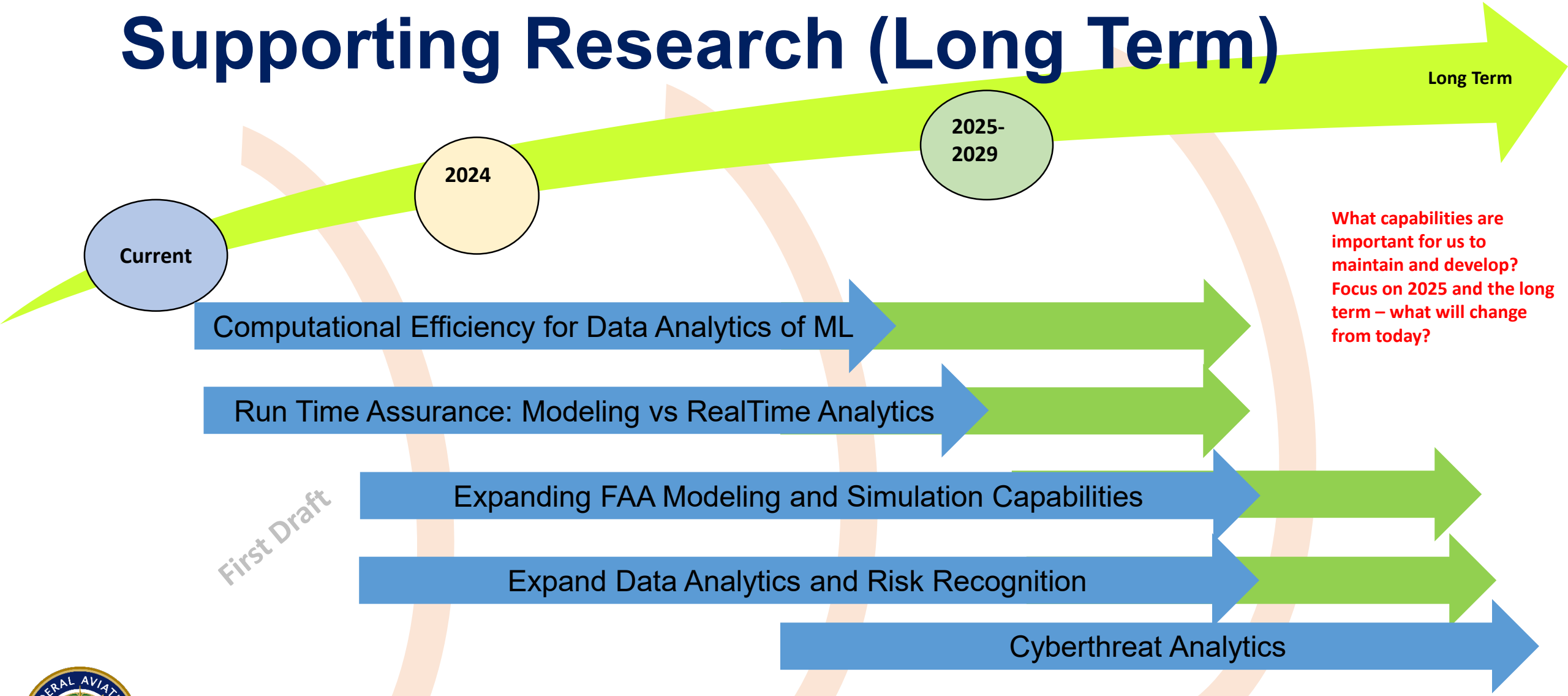
- Government Collaboration: runtime assurance of ML systems with safety analysis for OP-3
- Industrial Research: safety assurance and cybersecurity
- **FAA Internal Research: to proceduralize and generalize ML certification process to all AI applications**

Supporting Research (Long Term)



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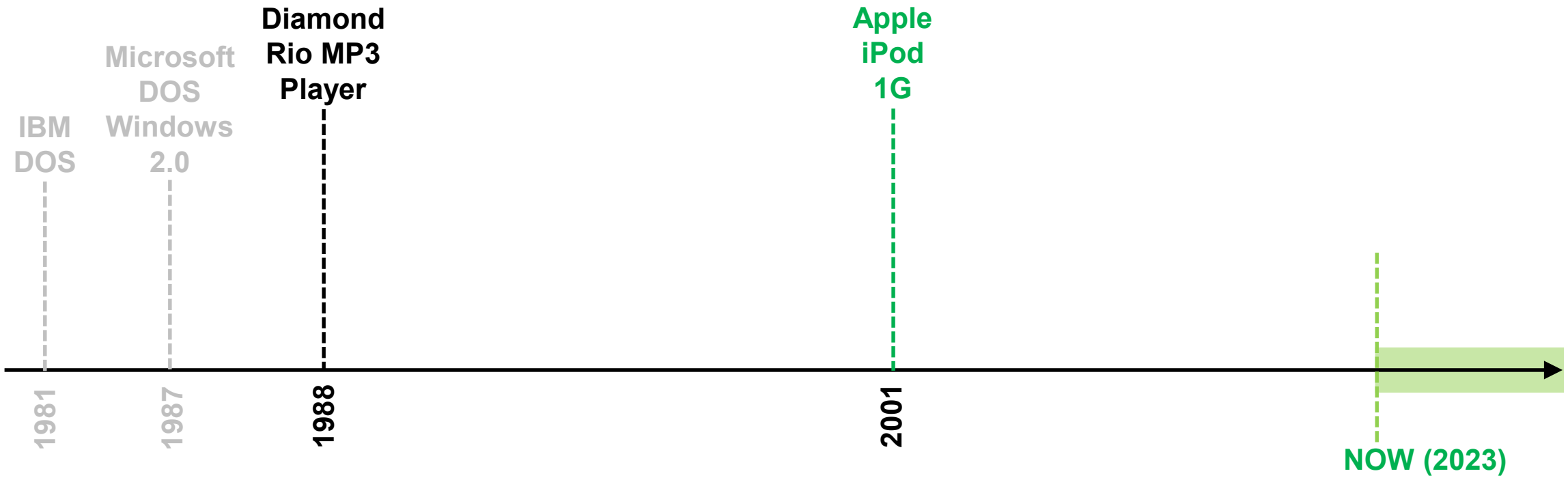

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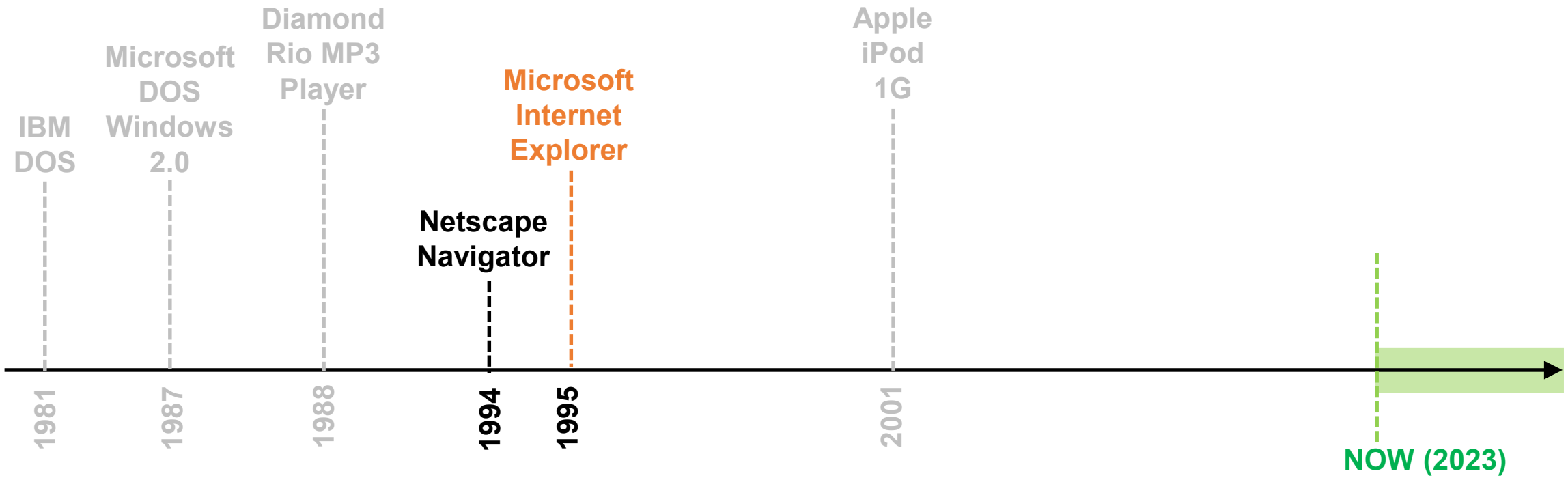

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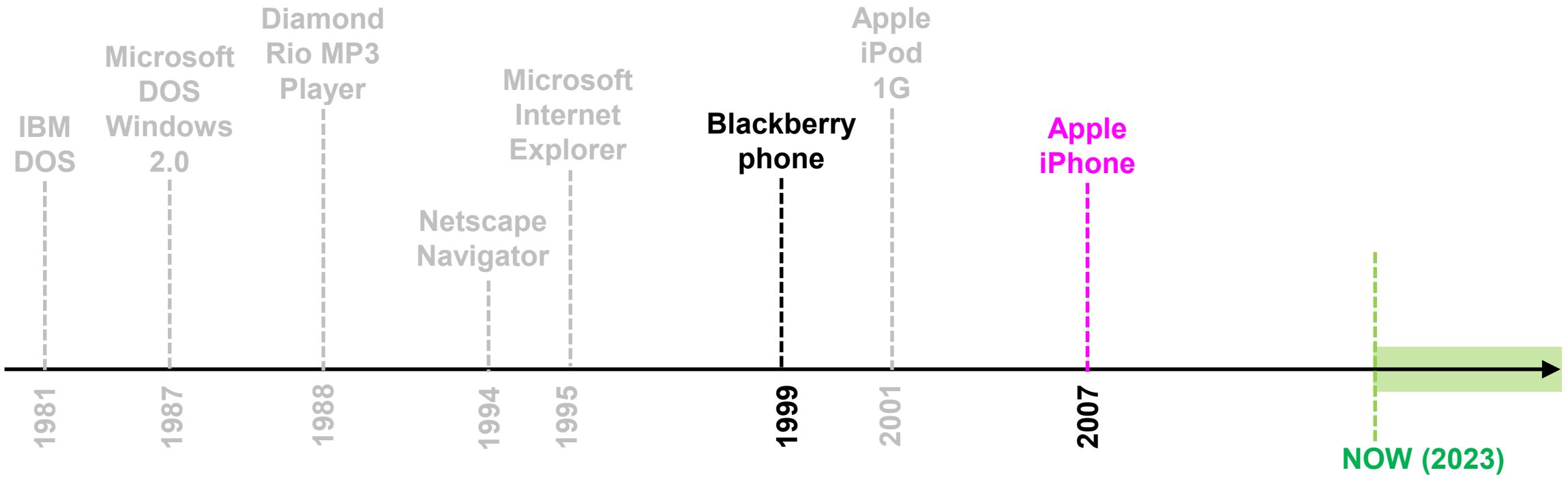

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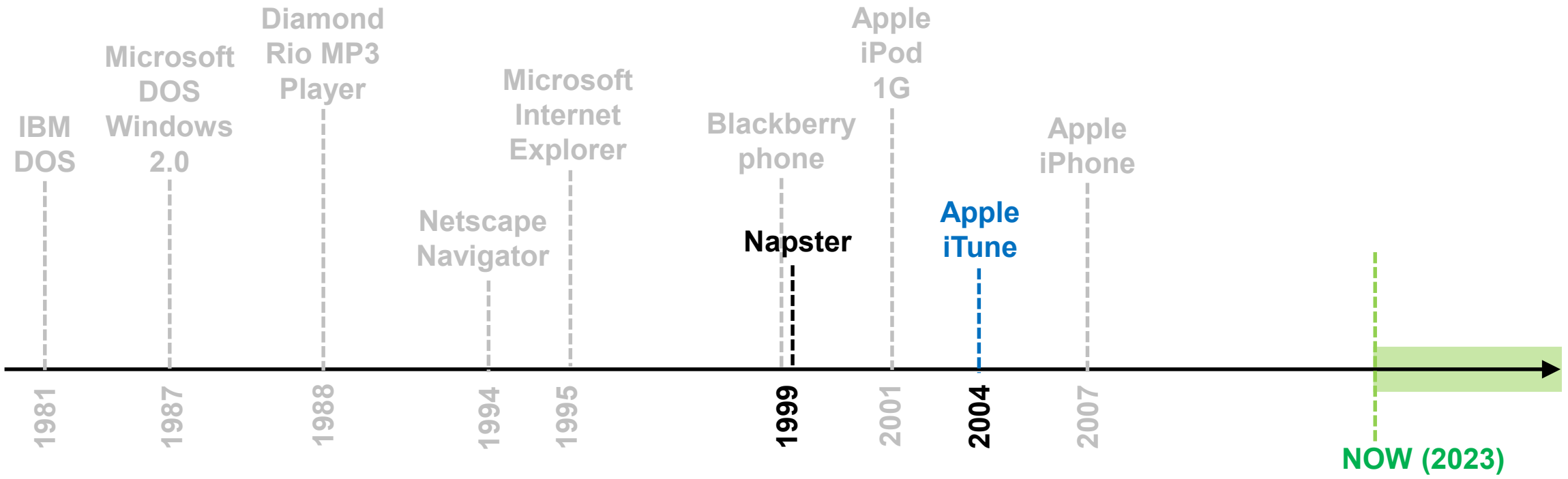

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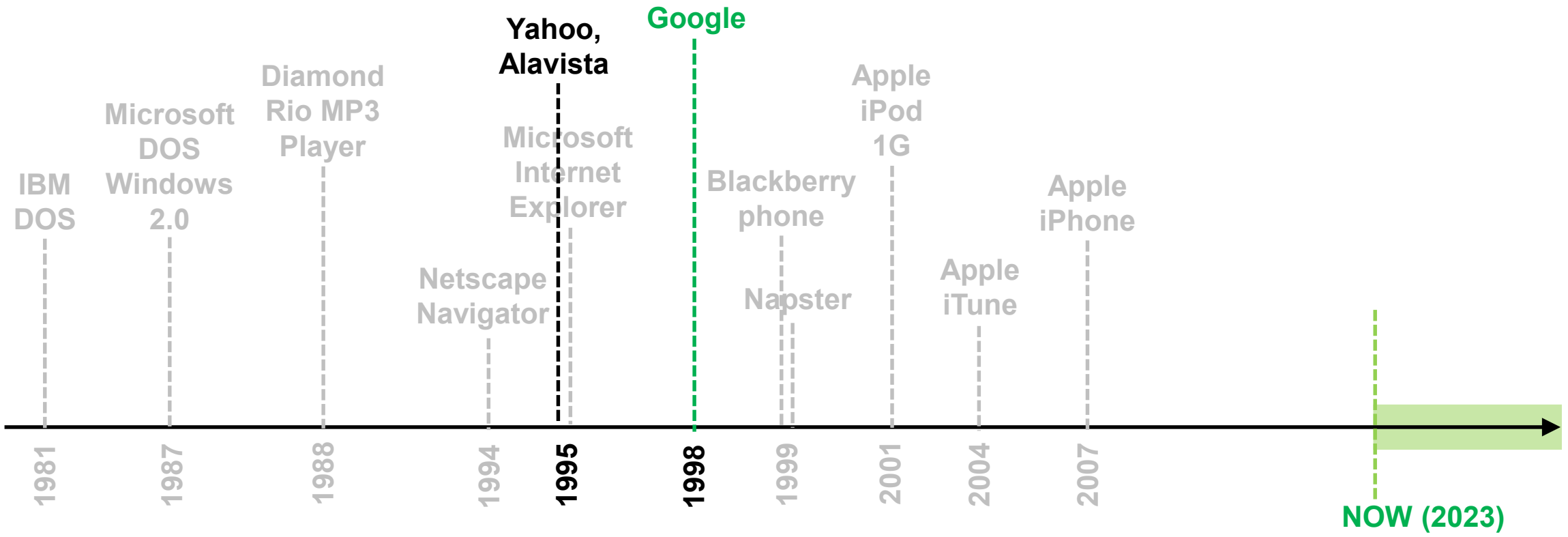

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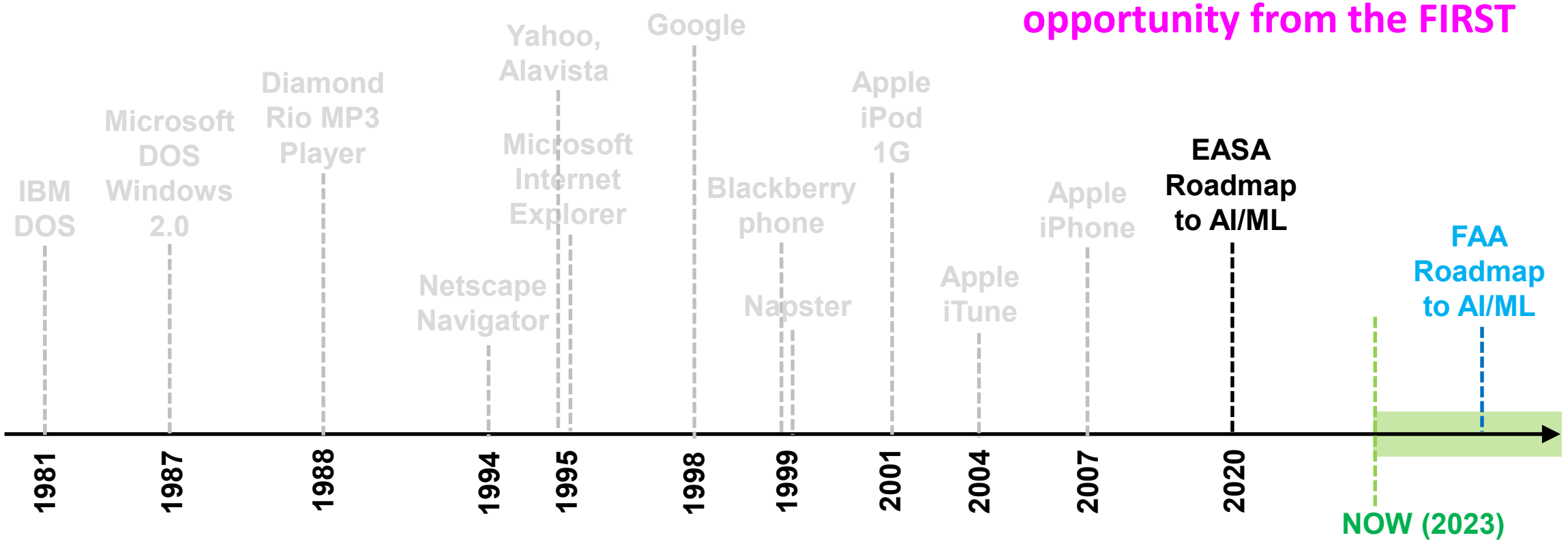
Being SECOND allows a learning opportunity from the FIRST



Thank you very much

Merci beaucoup

Muchas gracias

Cám ơn rất nhiều

非常感謝

Grazie mille

Muito obrigado

Moltes gràcies

आपका बहुत बहुत धन्यवाद