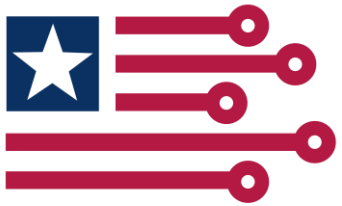
Natcast



Natcast is the operator of the National Semiconductor Technology Center ("NSTC"). The NSTC is powered by CHIPS for America, funded by the Department of Commerce.

R&D PROJECT FUNDING: ARTIFICIAL INTELLIGENCE DRIVEN RF INTEGRATED CIRCUIT DESIGN ENABLEMENT (AIDRFIC)

June 21, 2024

Submit Your Questions

Please submit your questions using the Zoom **Q&A** feature

All questions and answers will be posted to Natcast.org/research-and-development/AIDRFIC

Disclaimer

Statements and responses to questions about advanced microelectronics research and development programs in this presentation:

- Are informational, pre-decisional, and preliminary in nature.
- Do not constitute a commitment and are not binding on NIST or the Department of Commerce.
- Are subject in their entirety to any final action by NIST or the Department of Commerce.

Nothing in this presentation is intended to contradict or supersede the requirements published in any future policy documents or funding opportunities.

Today's Speakers

Deirdre Hanford
CEO
Natcast

Greg Yeric, PhD
Director of Research
for the NSTC Program
CHIPS R&D Office

Ronald Gyurcsik, PhD
Acting Program Manager
Natcast

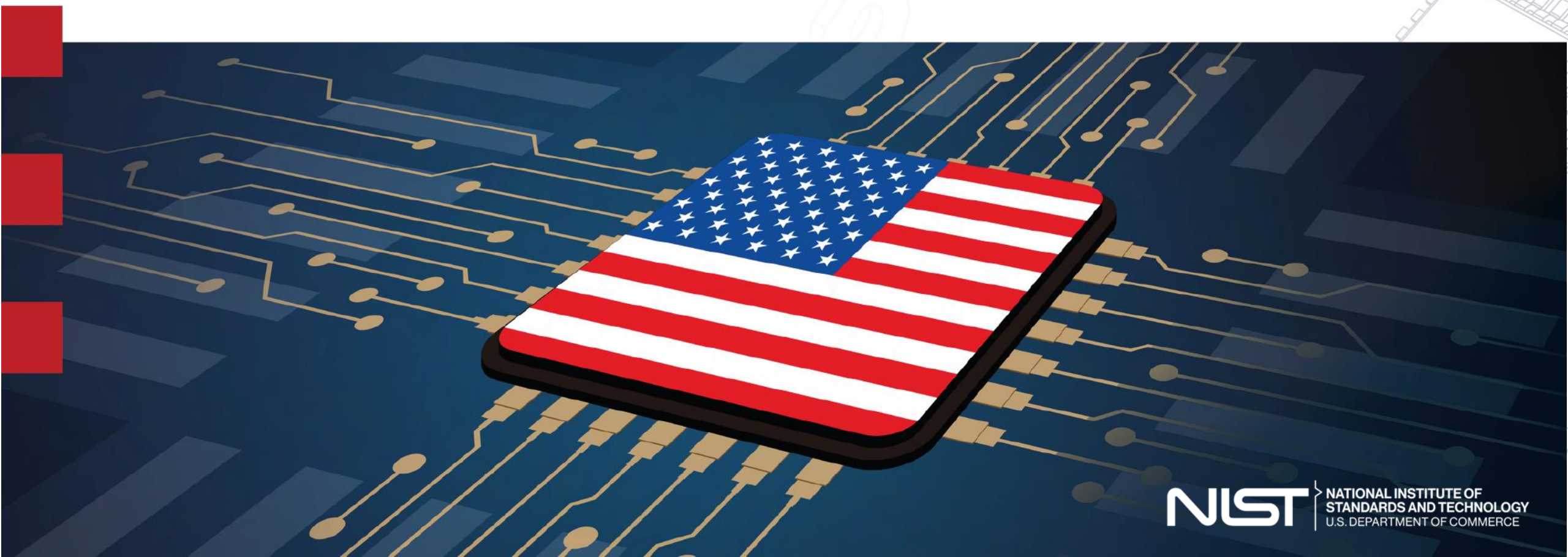
Agenda

- CHIPS for America Vision
- Work of the NSTC and Natcast
- Overview of Research Strategy
- AIDRFIC Program Details, Eligibility, and Key Dates
- Proposers' Day Overview

By the end of this webinar, attendees will better understand:

- ***Scope and schedule of the AIDRFIC program***
- ***Key dates of the AIDRFIC program***
- ***AIDRFIC Proposers' Day details***

CHIPS for America: Investment Overview



The CHIPS & Science Act

$39B
Incentives

Invest in U.S. production of strategically important semiconductor chips, and assure a sufficient, sustainable, and secure supply of older and current generation chips for national security purposes and for critical manufacturing industries.

$11B
R&D

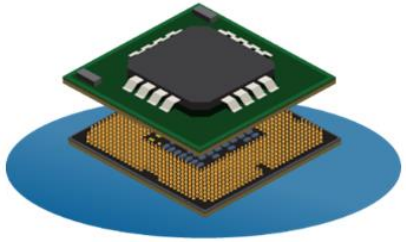
Strengthen U.S. semiconductor research and development (R&D) leadership to catalyze and capture the next set of critical technologies, applications, and industries.

$2B
DoD

The DoD Microelectronics Commons is a national network that will create direct pathways to commercialization for US microelectronics researchers and designers from “lab to fab.”

Workforce Initiatives

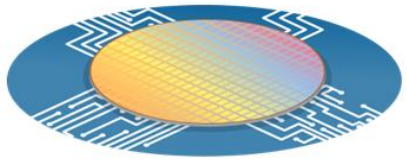
CHIPS R&D Programs



CHIPS National Semiconductor Technology Center (NSTC) Program

Natcast

Natcast is an independent nonprofit organization and operator of the NSTC consortium



CHIPS National Advanced Packaging Manufacturing Program (NAPMP)

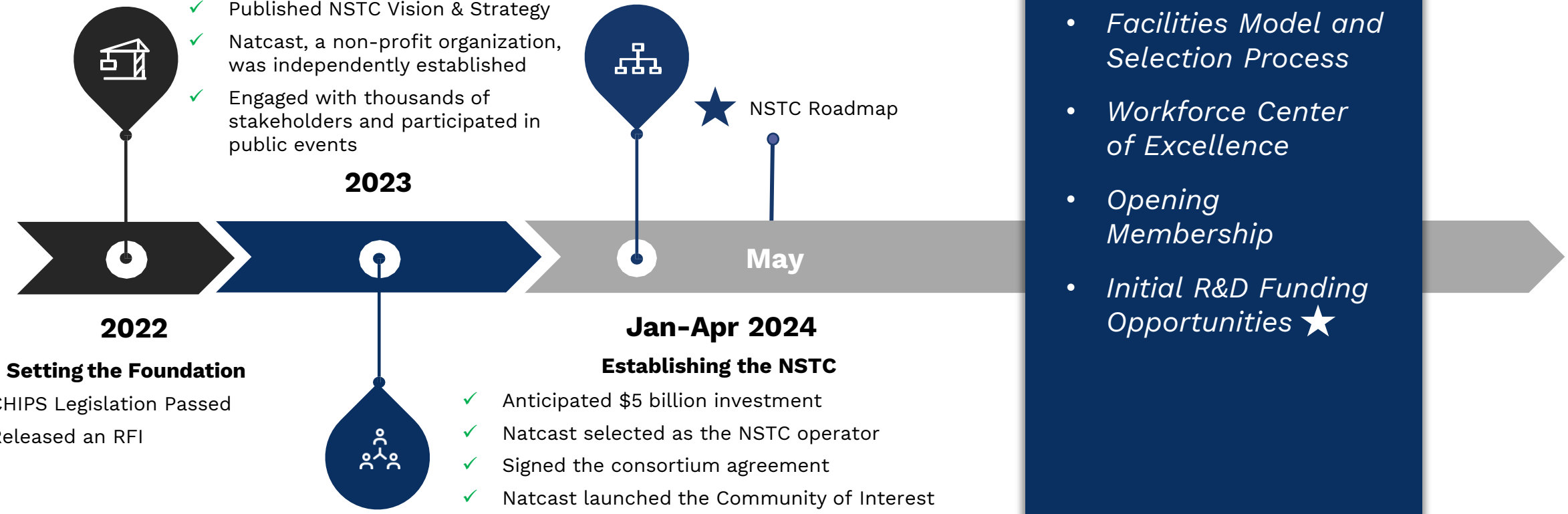
Manufacturing USA

CHIPS Manufacturing USA Program

CHIPS Metrology Program

Workforce Initiatives

History & Progress



2022

Setting the Foundation

- ✓ CHIPS Legislation Passed
- ✓ Released an RFI

2023

Engaging the Ecosystem

- ✓ Published NSTC Vision & Strategy
- ✓ Natcast, a non-profit organization, was independently established
- ✓ Engaged with thousands of stakeholders and participated in public events

Jan-Apr 2024

Establishing the NSTC

- ✓ Anticipated $5 billion investment
- ✓ Natcast selected as the NSTC operator
- ✓ Signed the consortium agreement
- ✓ Natcast launched the Community of Interest
- ✓ Hosted two public events with CHIPS & Natcast
- ✓ Natcast released RFI on Facilities & Capabilities

May

★ NSTC Roadmap

Coming Up

- *Facilities Model and Selection Process*
- *Workforce Center of Excellence*
- *Opening Membership*
- *Initial R&D Funding Opportunities* ★


Natcast

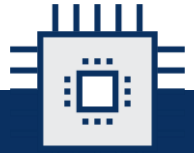
Focus Areas

Research

Member-driven TAB

Research & Development Projects

Prototyping



Lower Cost of Design

Design Enablement Gateway

Silicon Aggregation Services

Investment Fund

Workforce Development

Technicians Regional

Engineers

Researchers

NSTC to be a member-driven consortium that brings together a **diverse ecosystem**

Design	**Academia**	**Professional Services**
Manufacturers	**End Customers**	**Workforce Intermediaries**
Investors	**Govt. Organizations**	**Suppliers**

Guiding Principles

Accessible

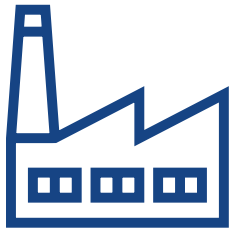
Valuable

Simple

Connected

Membership Opening Fall 2024

The Road Ahead

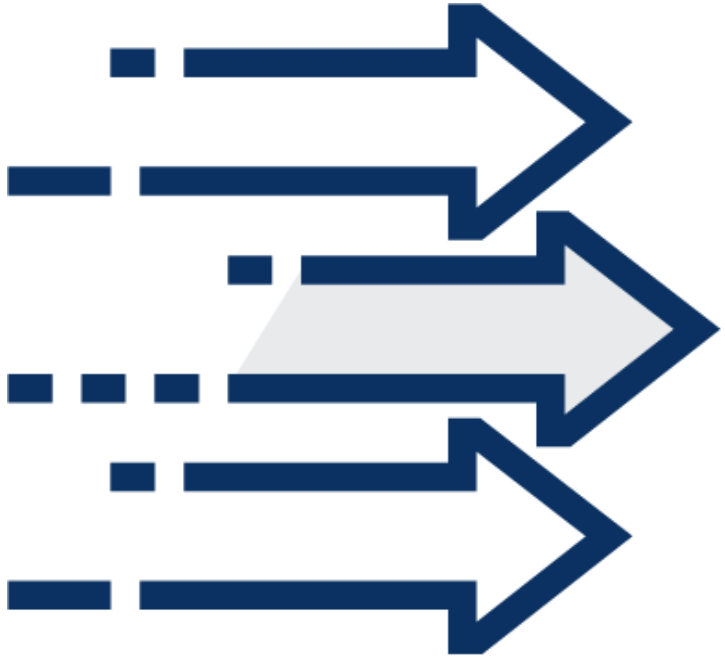


Facilities

Workforce Development

Early Jump Start Projects

Invite Members



Early Jump Start Projects

Artificial Intelligence Driven RF Integrated Circuit Design Enablement (AIDRFIC)

Opening Disclaimer

- The material in this webinar on the AIDRFIC program is pre-decisional and may evolve based on feedback and other considerations
- A call for proposals, once issued, will be the definitive source

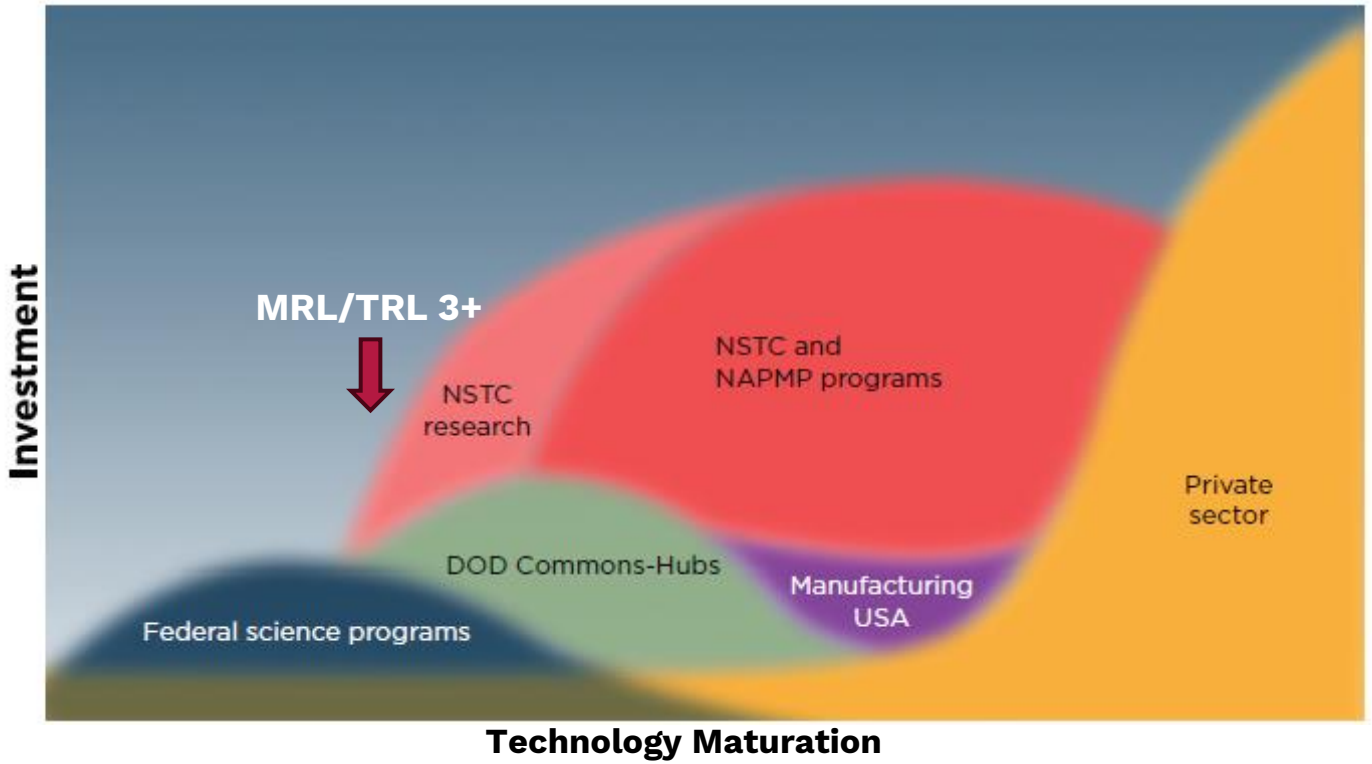
Reminder: Submit Your Questions

Please submit your questions using the Zoom **Q&A** feature

All questions and answers will be posted to Natcast.org/research-and-development/AIDRFIC

NSTC Research Focus

Goal: Enhance and mature promising technologies (TRL 3+) developed by universities, USG labs or others, thus lowering investment risk for US Semiconductor companies.



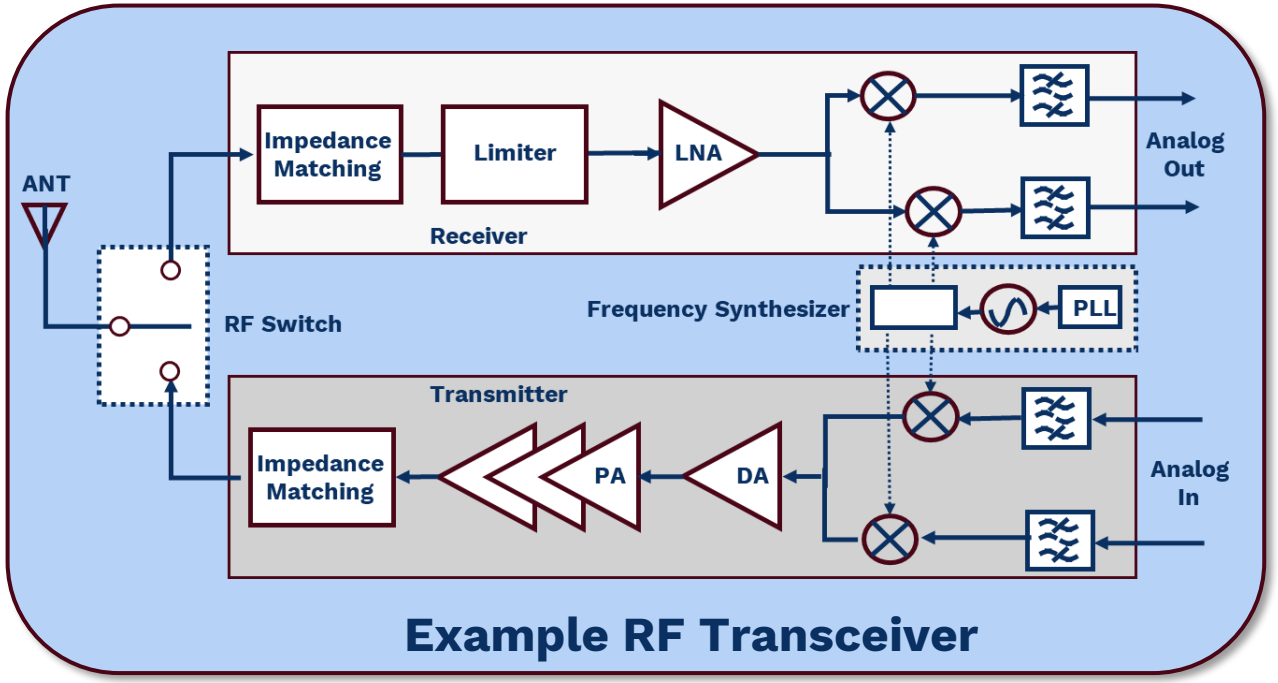
Overall Investment Plan

- > $100M Initial Investment
- 4-5 research topics over next 6 months; next 2 topics:
  - Test Vehicles
  - PFAS (under consultation)
- Project lengths up to 30 months

Image source: April 2023 NSTC Vision document

RFICs Are Everywhere

- **Wireless communication and connectivity**: integrated across many commercial applications and growing daily
- **Automotive radar systems**: transforming the way we drive and improving safety
- **Wireless sensor networks**: flexible and scalable, utilized across automation, security, and monitoring
- **Satellite communication**: providing signal amplification, frequency conversion, and modulation for communication and sensing



RF Circuit building blocks such as PAs, LNAs, Mixers, PLLs, switches, and impedance matching networks are common to many RF systems.

Why AIDRFIC?

Observations

- The growth and adoption of **AI technology** is transforming the way we live and work
- RFICs are key to an ever-increasing number of commercial, industrial, and defense systems

Challenge

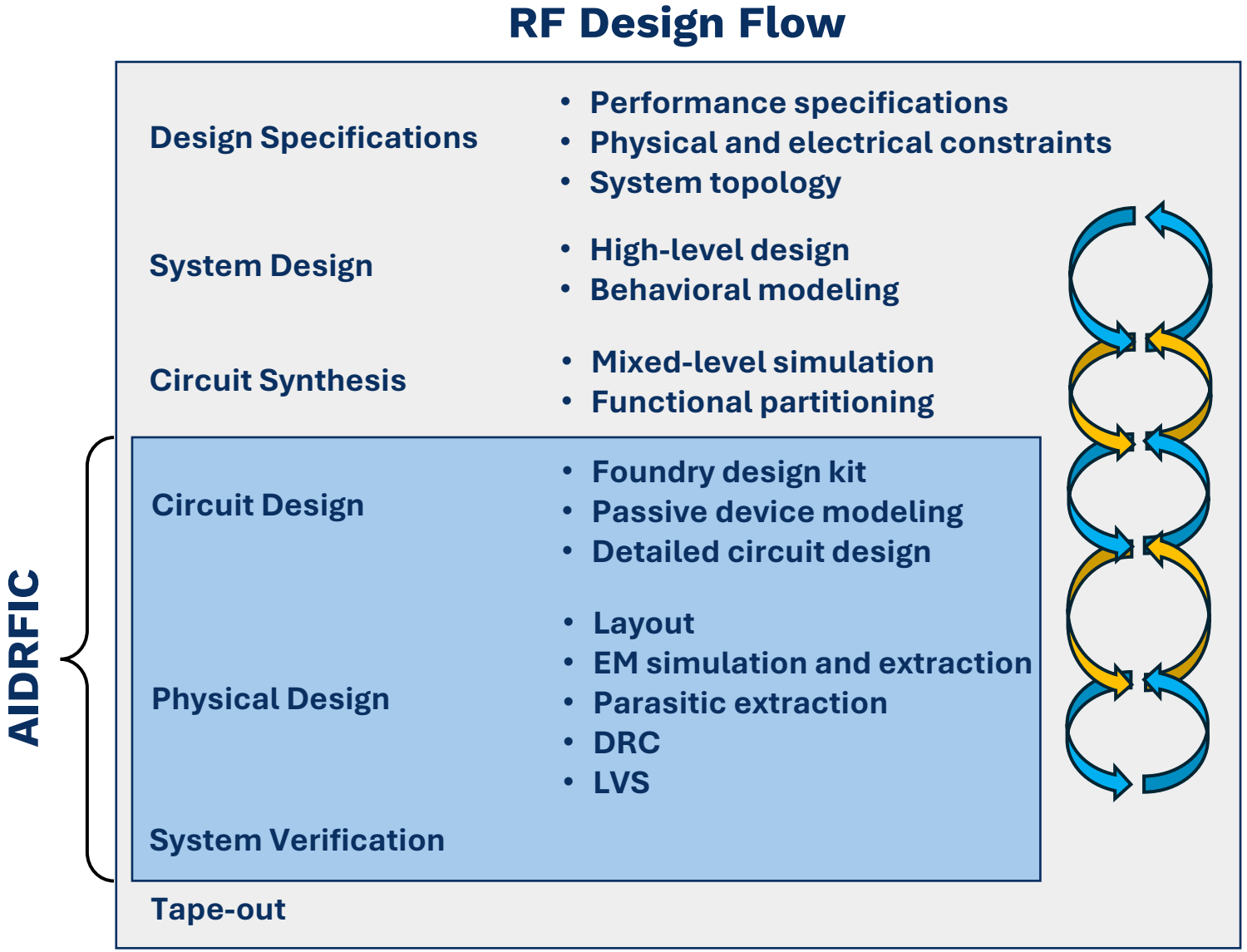
- Productivity of RF circuit design has not kept pace
- Limited workforce

Goals

- Lower the experience barrier to design RF Integrated Circuits
- Increase RFIC design productivity
- Optimize RFIC designs
- Generate unique, non-intuitive RFIC designs

AIDRFIC Focus

- Well understood design flow
- Iterative design
- Circuit Design, Physical Design and System Verification targeted
- Addresses program goals
- Supports greater exploration at system level



Task Scope

Task 1: Create training set and baseline performance data

- Develop training set
- Share training set with other teams
- Determine baseline productivity data

Additional Information

- Training set a Deliverable to Natcast
- Option to choose either a given Si/SiGe or GaAs process
  - GaAs exemplars at microwave frequencies
  - Si/SiGe exemplars at millimeter wave frequencies
- GaAs chosen due to broad availability and use within the commercial sector

Task Scope

Task 2: Update tools and integrate into an AI-based RFIC design flow

- Update tools
- AI-enabled tools should be able to perform “inverse” goal-driven design
- Demonstrate the capability to learn through training and/or use

Additional Information

- Address sensitivity to layout and process variations
- Detect and flag erroneously generated results
- Tools and methodology should be process independent

Task Scope

Task 3: Demonstrate updated tools

- Use AI-enabled tools to design two RF circuits with Natcast supplied specifications
- Compare performance of generated circuits to exemplar specifications
- Document approach and tools
- Detail strengths and weaknesses

Additional Information

- Natcast will provide initial exemplar RF circuit specifications
- Demonstrate capabilities of tools

Task Scope

Task 4: Refine AI-enabled tools, benchmark results, and validate performance

- Use AI-based design tools to design up to 5 additional RF circuits and populate a shared test wafer
- Submit designs for considered inclusion on shared wafer run
- Fabricated ICs tested and validated by independent third party

Additional Information

- Natcast will provide the specifications for additional exemplars derived from real-world systems
- There will be five Si/SiGe millimeter wave specifications and five GaAs microwave specifications

Task Scope

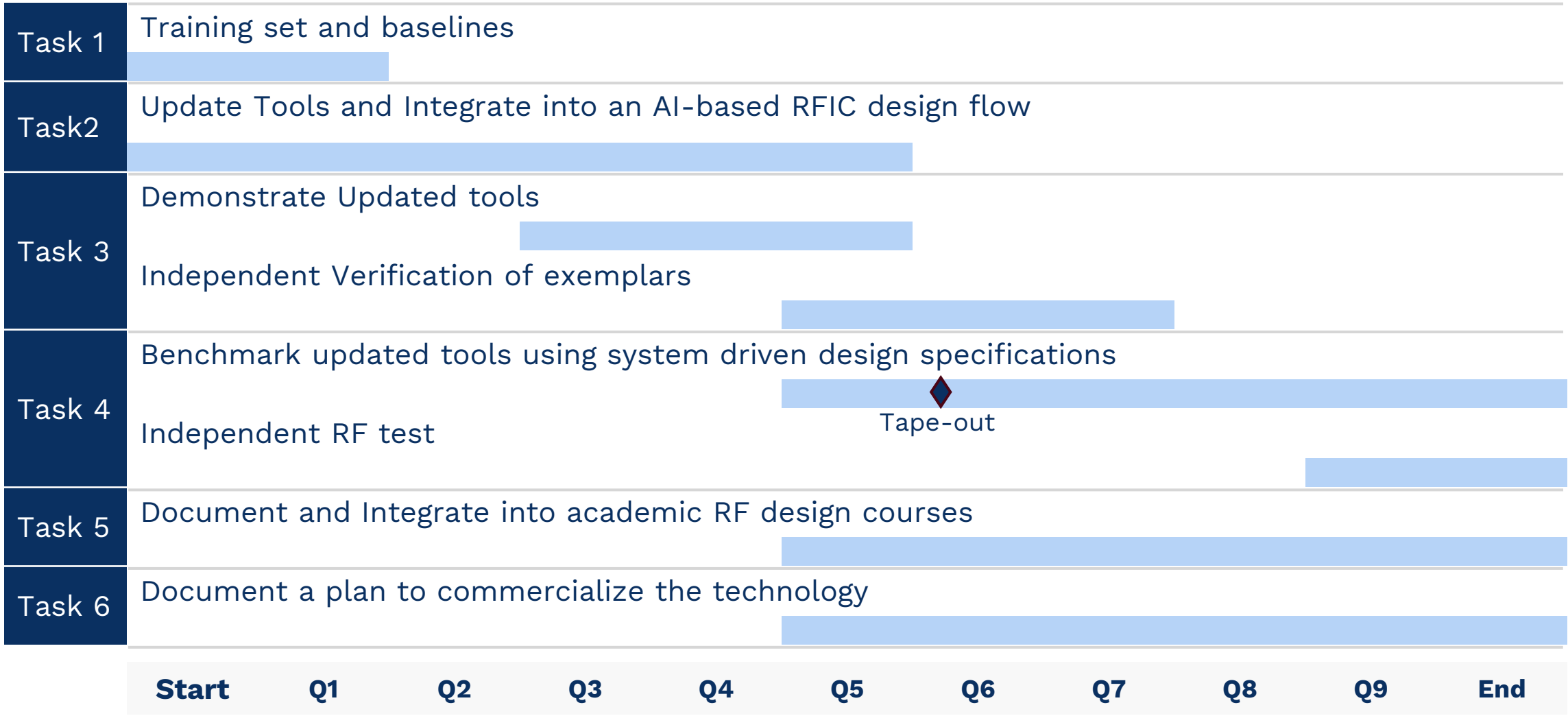
Task 5: Document and integrate into RF design courses

- Identify learnings from the AIDRFIC project most relevant to academic curriculum or a workforce training program
- Identify a suitable class or training and develop a plan to integrate AIDRFIC learnings into the training

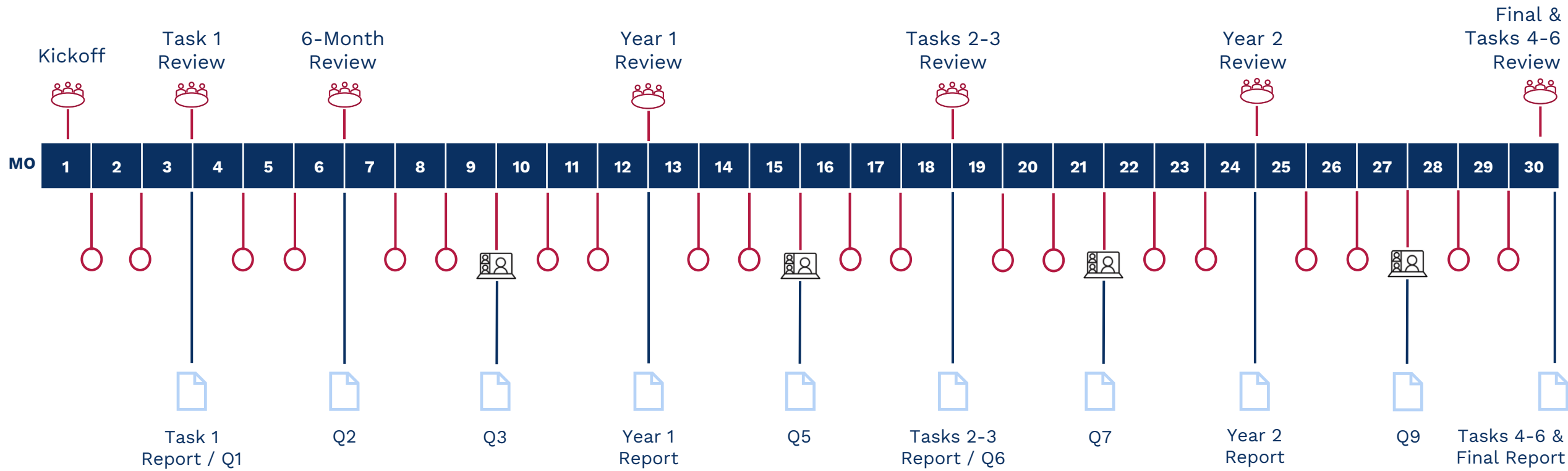
Task 6: Develop a business plan to commercialize technology

- Publish or patent the results of the AIDRFIC project, as appropriate
- Develop a technology transition plan to commercialize the technology and make it available
- Document expected commercial, economic, and national security benefits to the United States

Task Timeline



AI for RF Schedule *AIDRFIC*



AIDRFIC Details and Key Dates

- **Anticipated Amounts:** Total program funding up to $30M with 3-4 awardees anticipated
- **Eligibility:** Natcast members at the time of award. Must be eligible to become Natcast members to propose
- **Cost Sharing Requirements:** None
- **Teaming Opportunities:** Proposers' Day will facilitate teaming on July 11, 2024. Teams encouraged to start discussions prior to 7/11

Key Dates

Call for Proposals Released	**June 28, 2024***
Proposers' Day	**July 11, 2024**
Executive Summary Due	**July 25, 2024**
Proposals Due	**August 16, 2024**
Target Awards Announced	**October 17, 2024**
Target Project Start	**December 2, 2024**

***Target**

Proposers' Day Agenda*

7:30 – 8:30	Registration/coffee
8:30-8:40	Introductory remarks
8:40-9:30	DOC & Natcast Overview
9:30-10:20	RF design challenges of today and tomorrow panel session
10:20-10:40	Break
10:40-11:30	Potential of AI in RF IC design panel session
11:30-12:00	AIDRFIC Program overview
12:00-1:00	Lunch (on site)
1:00-2:15	5-10min presentations by researchers who have demonstrated use of AI in RF design
2:15-2:30	Break
2:30-3:15	3-5min presentations by entities that could function as team members
3:15-4:15	Informal breakout sessions for teaming discussions
4:15-4:45	Submission and evaluation process
4:45-5:00	Wrap-up

* Subject to change

When:
Thursday,
July 11, 2024

Where:
Hilton
Arlington

Details:
To be posted to
Natcast.org

Intellectual Property (IP) and Data Rights

All proposers must identify

- Pre-existing IP used to complete the project
- IP that may be developed with Natcast funding if awarded

Proposals must include an Intellectual Property Management Plan that

- Commits a government patent license to patentable foreground IP & government data rights for government purposes in reported information
- Grants Natcast a sublicensable license to developed IP and performance data for noncommercial purposes
- Offers additional proposer-defined IP benefits to the NSTC membership and/or to advance domestic production

Teaming

Teams are expected to include a subset of

- University researchers (R&D, training and workforce development)
- Commercial RF and defense companies (RF design)
- Si/SiGe and/or compound semiconductor foundries (Foundries)
- Established and/or start-up EDA tool companies (EDA tools and flows, commercialization)
- US government funded labs (RF design, Foundries)

Fully Addressed at Proposers' Day

July 11th – Hilton Arlington

- Fundamental research definition and implications
- Research security
- Commercial viability and domestic production
- Evaluation, selection criteria and review process
- Meeting and reporting schedule
- Budget format and payment terms

Proposers' Day – July 11th
Please Respond With Your Interest by June 28th

Panel Members and Moderators Needed

- RF design challenges of today and tomorrow panel session
- Potential of AI in RF IC design panel session

Presentations by Interested Team Leaders and Participants

- 5-10min presentations by researchers who have demonstrated use of AI in RF design
- 3-5min presentations by entities that could function as team members

Proposal Reviewers Pool Members

Foundries interested in fabricating multi-project wafers

Please respond to Ron Gyurcsik at AIDRFIC2024@natcast.org

All Proposers' Day details and signup at Natcast.org/research-and-development/AIDRFIC

Thank You!

Sign up for our email newsletter at Natcast.org

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