NSF Investments in Systems Research Infrastructure

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Outline

I. Celebrating GEC 25
II. PAWR
III. TIPOFF
IV. A Call to Action

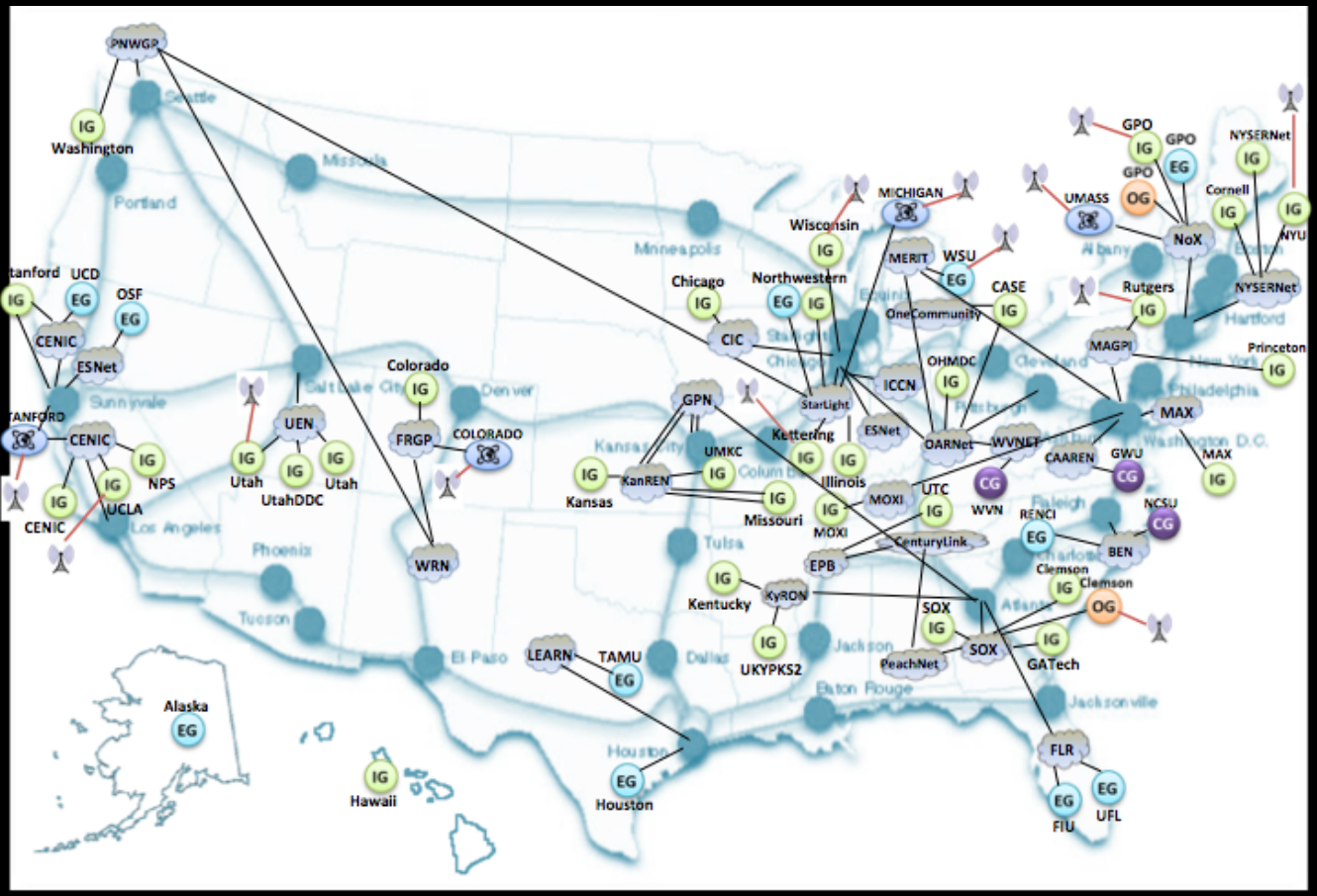
Why Should CISE Invest in Research Infrastructure?

- Experimentation
  - To support at-scale systems research
- Leverage
  - Pooled resources including community expertise
- Reproducibility
  - Through open, shared platforms

    See NSF 17-022
- Broaden Participation
  - Increase access for underserved groups

CISE-Supported Infrastructure

- Wired: 58 sliceable GENI Racks
- Wireless: 26 Base Stations @ 13 Sites
- NSF Cloud @ 2 Sites
- Campus Cyberinfrastructure
- US Ignite Cities



GENI as Engineering Feat

- 300 faculty and students at 60 universities have built GENI
- 9000 research and educational experimenters
- GENI users come from over 180 US universities and 30+ countries
- GENI has filled a quarter million computing experiment resource reservations

GENI Accomplishments

- Results from GENI experiments have been published in 330 papers, theses, & book chapters
- 980 students used GENI in 23 different classes—in one semester
- Over 68 instructors use GENI as a virtual laboratory in their classrooms

GENI Innovations

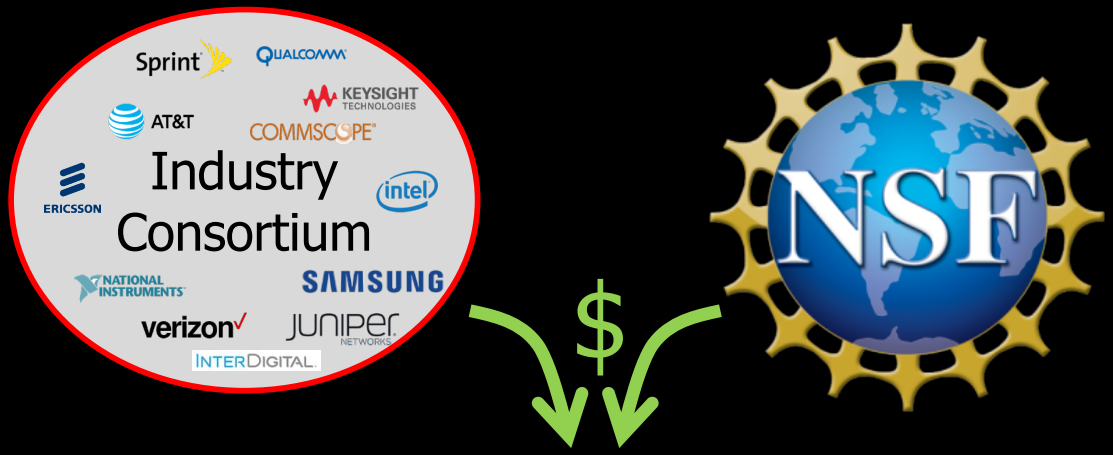
- Federation architecture to support interoperability of independent testbeds across 5 continents
- Techniques for software-defined networks, dynamic resource scheduling, network and computing virtualization
- Protocols to enable interconnection of dynamic computing resources and scientific instruments forming emerging DoE SuperFacilities

PLATFORMS FOR ADVANCED WIRELESS RESEARCH (PAWR)

Platforms for Advanced Wireless Research

- Public-private partnership to deploy an array of mid-to-large scale research platforms on various topics
  - "Pre-competitive" research areas (3-8 years out)
  - Proposed by community-University teams
  - Industry involvement a key component
- Four platforms over next five years
  - "City-scale" (not necessarily city-size)
  - 10-20 antenna sites, backhaul
  - ~100 SDR-based clients (experimental, not production)
- Investment: $100M over next five years
  - $50M NSF + $50M from Industry Consortium
  - Expected 7+ year lifetime
- Researchers apply for funding to use platforms in their grants

PAWR Structure

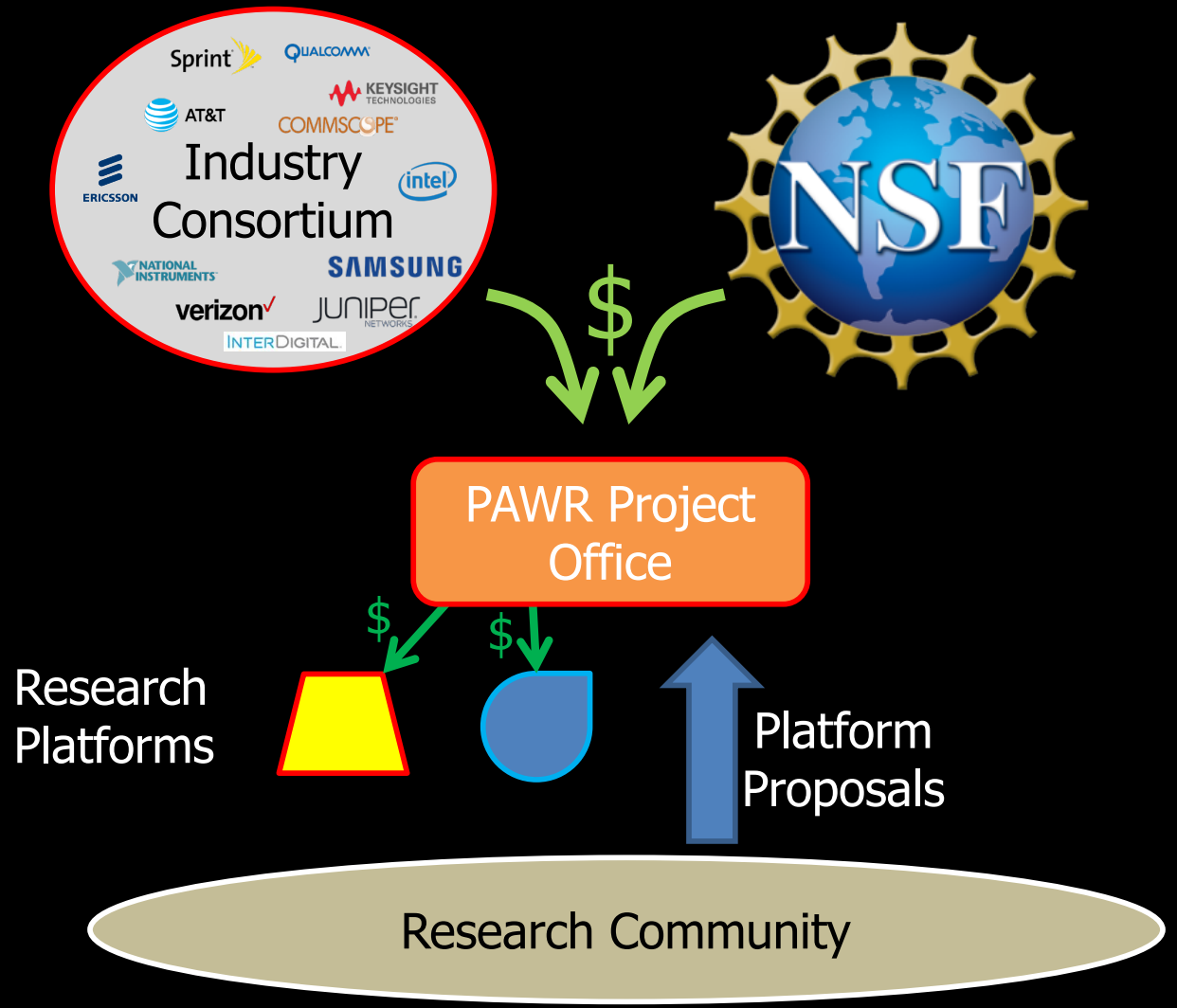


PAWR Project Office

Platform Proposals

Research Community

PAWR Structure



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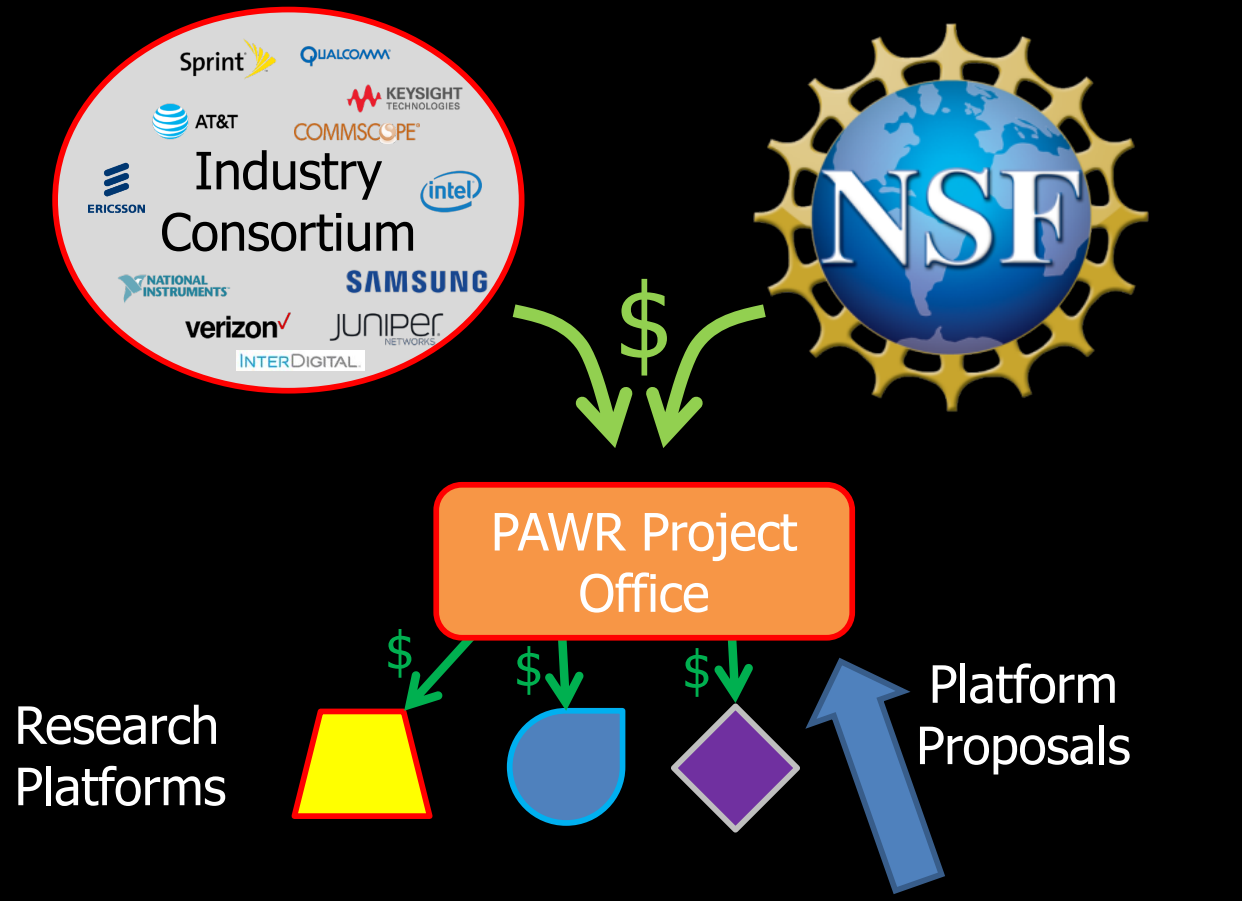
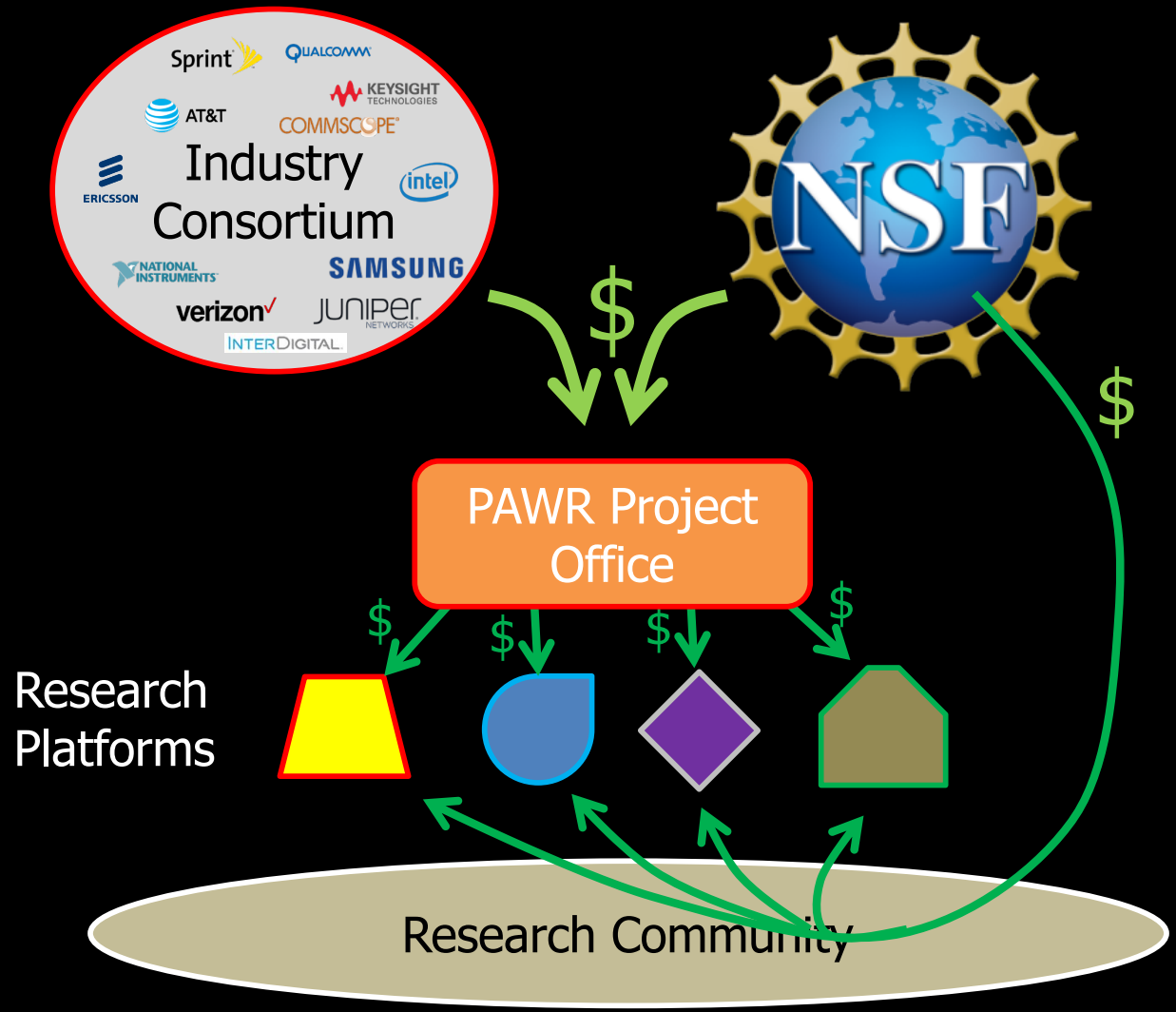
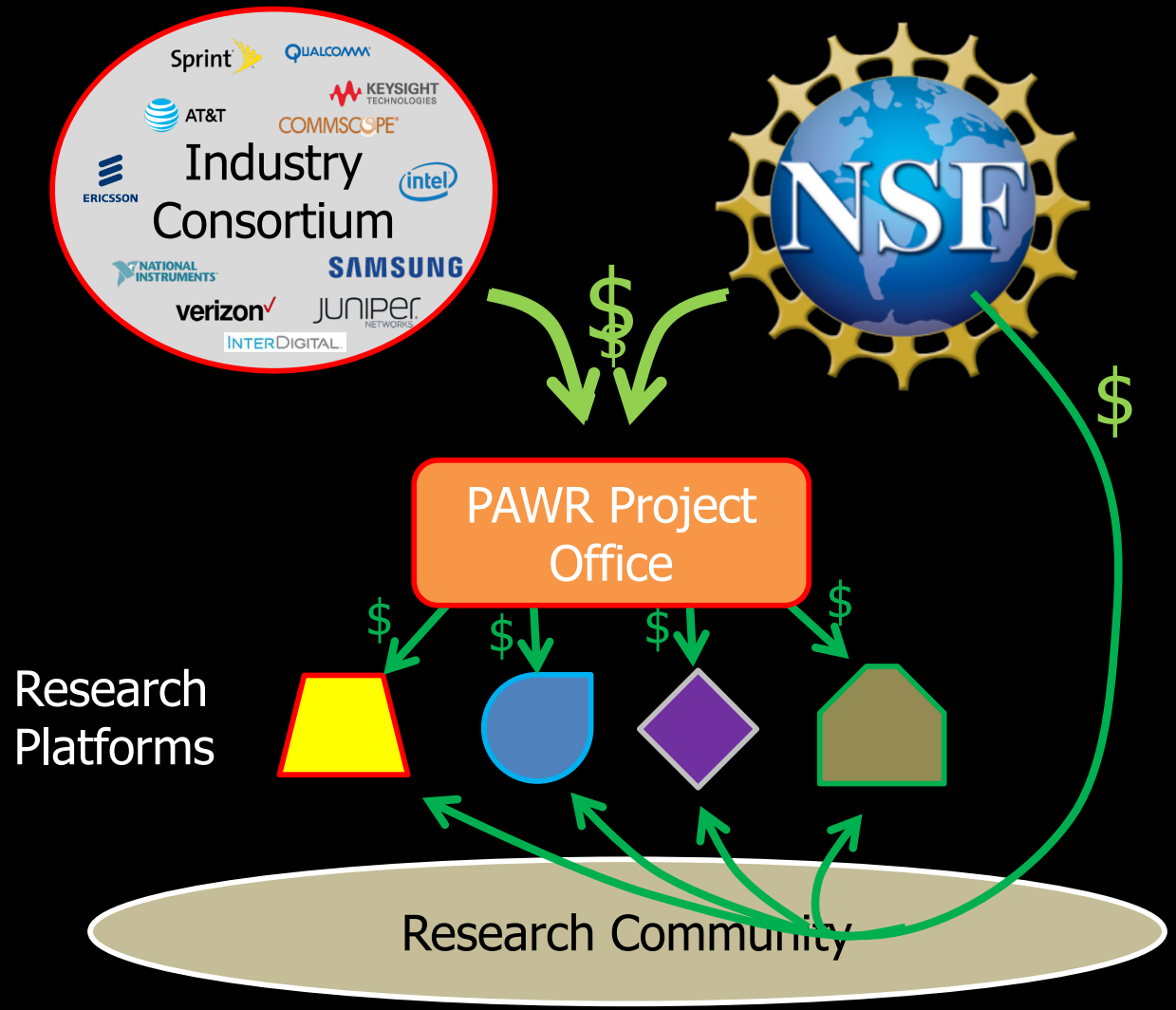


PAWR Structure



PAWR Structure



PAWR Program Structure

PAWR Project Office

Research Platforms

Research Community

PAWR Program Office (PPO)

- Solicitation 16-585
  - Issued July 2016
- Full proposals submitted November 2016
- Review process included Reverse Site Visits
- Last week NSF announced $6.1M award to a team comprising:
  - US Ignite, Inc.
  - Northeastern University

PAWR Sequence

We are here

- PPO Selection
- Integration of contributions from NSF, Industry
- Develop Reference Design & RFP
- Issue RFP
- Platform proposals submitted
- Review proposals, award platforms

PAWR Leverage

- Companies and NSF pool resources
  - Support larger, more advanced research infrastructure
- Academic researchers can run experiments in real-world deployment scenarios
  - Well beyond any University lab
- Companies gain access to the energy and talent of NSF's community of 400+ wireless researchers
  - Far more than any one could deal with individually

PAWR Leverage

- Academic researchers gain access to industry's tech know-how and experience with real-world challenges
- Communities gain experience with the wireless infrastructure of tomorrow

NSF 17-540

TOMORROW'S INTERNET PROJECT OFFICE (TIPOFF)

TIPOFF

- The world has changed since GENI began
  - GENI played a role in that!
- GENI focus has shifted
- TIPOFF mission: serve the research needs of today's (and tomorrow's) network and systems researchers
  - Leveraging, sustaining the existing platform

TIPOFF Responsibilities

- Visioning
  - Engage research community stakeholders
  - Identify needed capabilities and resources for next-generation platform
- Maintaining
  - Continue operation of the existing platform/resources
- Enriching
  - Modernize and extend the current infrastructure
- Sustaining
  - Develop approaches to outlast NSF funding
    - Goal: self-sustaining after 3 years

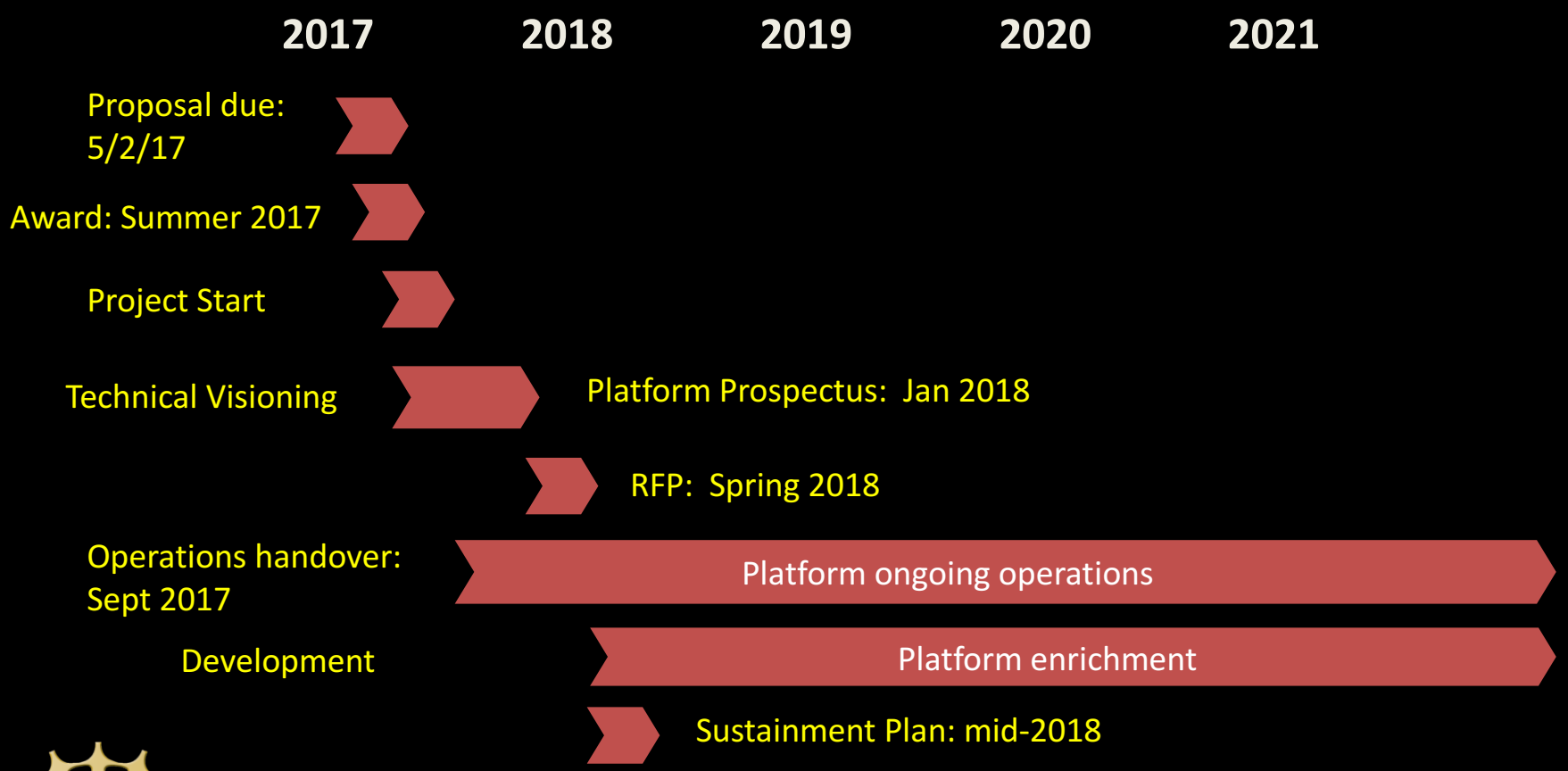
TIPOFF Parameters

- Eligibility: Universities, nonprofits, for-profits
- $10M award budget
  - Includes vision-driven equipment upgrade/refresh
- Proposals due 2 May 2017

Key Evaluation Criteria

- TIPOFF Management Team
  - Dedicated and experienced project staff
  - Ability to work collaboratively to provide services to the research community
  - Demonstrated success in managing large-scale hardware- and software-intensive infrastructure projects

TIPOFF Timeline



Tomorrow's Internet Project Office
(TIPOFF)

CALL TO ACTION

Envision the future research infrastructure.

Be Ambitious!

Talk to us about it!

Thank you!

Questions…