NOAA HURRICANE FORECAST IMPROVEMENT PROJECT

Frank Marks & HFIP Writing Team

OAR/AOML/Hurricane Research Division

9 November 2017

What, Why, Who, & When?

Develop an updated plan, detailing the specific research, development, and technology transfer activities necessary to sustain HFIP and achieve the 3 focus areas in **Section 104 of the Weather Research and Forecasting Innovation Act**:

1. improving the prediction of rapid intensification and track of hurricanes
2. improving the forecast and communication of storm surges from hurricanes
3. incorporating risk communication research to create more effective watch and warning products

The plan will detail long-term HFIP goals, priorities, and approaches.

What, Why, Who, & When?

SEC. 104. HURRICANE FORECAST IMPROVEMENT PROGRAM.

(c) PROJECT PLAN—Not later than 1 year after the date of the enactment (**April 2018**) of this Act, the Under Secretary, acting through the Assistant Administrator for OAR and in consultation with the Director of NWS, shall develop a plan for the project … that details the specific research, development, and technology transfer activities, as well as corresponding resources and timelines, necessary to achieve the goal set forth …

OAR requested AOML/HRD (Frank Marks) lead the development of the plan in consultation with HFIP resulting in formation of a Strategic Writing Team.

What, Why, Who, & When?

Strategic Writing Team

Mark DeMaria (NWS/NHC)	Mike Brennan (NWS/NHC)	Jamie Rhome (NWS/NHC)
Gopal (OAR/AOML)	Rob Rogers (OAR/AOML)	Jason Sippel (OAR/AOML)
Vijay Tallapragada (NWS/EMC)	Avichal Mehra (NWS/EMC)	Jennifer Sprague (NWS)
Morris Bender (OAR/GFDL)	Tim Marchok (OAR/GFDL)	Alan Gerard (OAR/NSSL)
Ed Mifflin (NWS/STI)	*Nicole Kurkowski (NWS/STI)*	***Frank Marks (OAR/AOML)***
Nysheema Lett (NWS/STI) Exec Sec		

- Update original HFIP plan (July 18, 2008), incorporating recommended short- and long-term programmatic HFIP goals into the HFIP strategic plan, outlining specific steps for achieving model advancements and improvements in predictive capabilities.
- Organize goals within the plan by the three Weather Act focus areas.

What, Why, Who, & When?

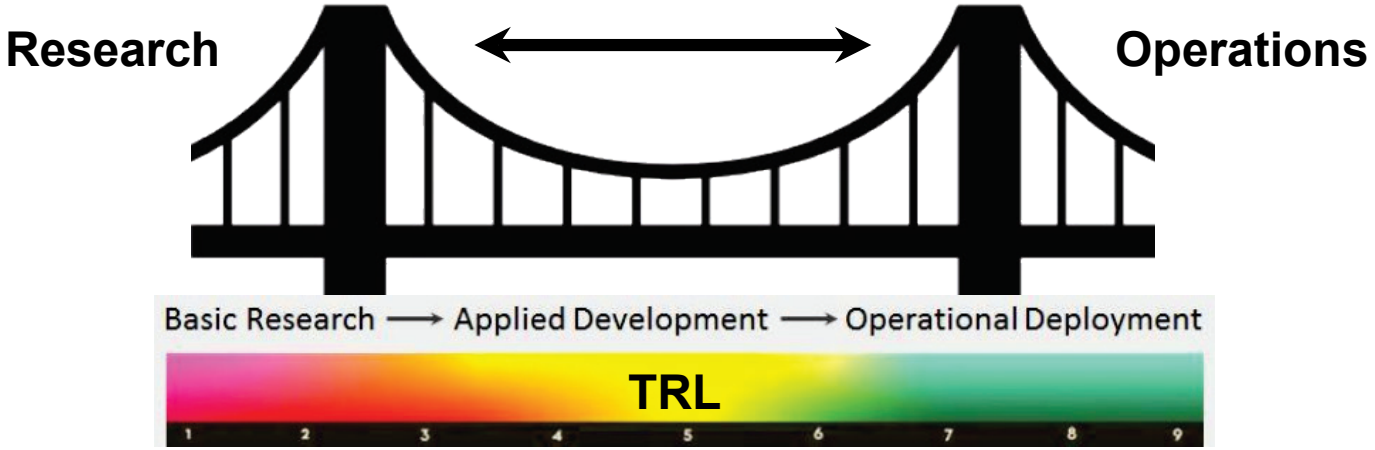
Timeline for plan development:

- ✓ October 11-12, 2017 – Writing team kick-off meeting
- ✓ November 7, 2017 – In-person writing team meeting; First draft of strategic plan completed (v0.1)
- ✓ November 8-9, 2017 – Present draft plan at HFIP Annual Meeting
- November 30, 2017 – Present draft plan at NOAA Hurricane Conference
- December 1, 2017 – Feedback due back on plan from HFIP community
- December 31, 2017 – Complete v0.2 of plan to HFIP management team
- January 31, 2018 – Complete v1.0 of HFIP plan, based on HFIP management team comments. Share with NWS/OAR leadership.
- February – March 2018 – HFIP plan vetted through NWS / OAR leadership; Updated plan based on feedback from leadership, as needed
- April 2, 2018 – Final HFIP report delivered to Congress

Updated HFIP Goals

- Extend improvement of current forecast skill (track, intensity, and size) by 50%
- Extend forecast (track and intensity) guidance to 7 days with skill comparable to the 5-day forecast
- Reduce by 50% forecast uncertainty associated with RI (95th percentile of intensity change distribution) at all lead times; e.g., reduce 48-h intensity error by at least 1 category.
- Improve guidance on timing, track and intensity for pre-formation disturbances by 20%
- Improve hazard guidance products and warnings, including storm surge, sustained wind, gusts, ocean waves, rainfall, and locally severe weather, at 3-day lead-time
- Modernize TC product suite to incorporate better risk communication

Key Strategies



- Advance operational hurricane analysis and forecast system (HAFS)
- Improve probabilistic guidance
- Enhance communication of risk and uncertainty
- Increase HPC Capacity
- Research to Operations (R20) Enhancements
- Broaden expertise and expand interaction with external community

Extra slides

Priorities & Milestones

- **Advance operational hurricane analysis and forecast system (HAFS)**
  - R&D for HAFS to advance deterministic and ensemble prediction capabilities
  - R&D for fusion of modeling, data assimilation and observations to produce an analysis of record
  - R&D for statistical post-processing to extract guidance and uncertainty information
- **Improve probabilistic guidance**
  - Calibrate guidance with HAFS
  - Incorporate dynamically-based uncertainty into hazard models and products
  - R&D for hazard-specific products from HAFS
- **Enhance communication of risk and uncertainty**
  - Evaluate TC products for the effective communication of risk
  - Modernize TC products as informed by social and behavioral science

Priorities & Milestones

- **Increase HPC Capacity**
  - NOAA R&D and operational computing to support HAFS development
  - Sustain modeling and software engineering expertise
  - Match with technological innovations (i.e. keep pace with new technologies)
- **Research to Operations (R20) Enhancements**
  - Accelerate transition to operations by following NOAA's best practices for promoting technical readiness levels (TRL)
  - Develop a process to prioritize research targeted for operational improvements
- **Broaden expertise and expand interaction with external community**
  - Re-invigorate the grants program
  - Maintain a visiting scientist program at research and operational centers
  - Advisory committees, community workshops
  - Collaborate/coordinate with social and behavioral sciences
  - Outreach to America's Weather Industry (AWI)