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# Probabilistic Forecasting of Ceiling and Visibility in NCV: Development Progress

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# C&V Effects on the NAS

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## Transports – Pt. 121 & 135

- Needs are terminal-centric
- ... It's not just the 'severe' cases that hurt...

## GA – Pt. 91

- IFR avoidance critical.
- In-route and at airports.
- 0-6 hr forecast critical.

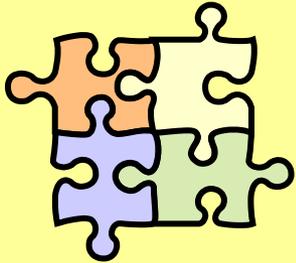
## Helo EMS – Pt. 91 & 135

- IFR avoidance critical.
- In-route and at airports.
- 0-3 hr forecast critical.



# C&V Forecast Challenge as seen in FY10....

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**A wealth of complementary forecast capabilities:**

LAMP, RUC, RR, HRRR, NAM, SREF, VSREF,  
... and on the way – NARRE, HRRRE + others.

## **Critical 'NowGen' knowledge gaps ....**

- Limited info on skill of time-lagged ensembling – RUC, RR.
- Limited info available on LAMP probabilistic skill.
- How best to draw from the 'cloud' of capability above?
- How best to enable forecaster model selection/interaction.

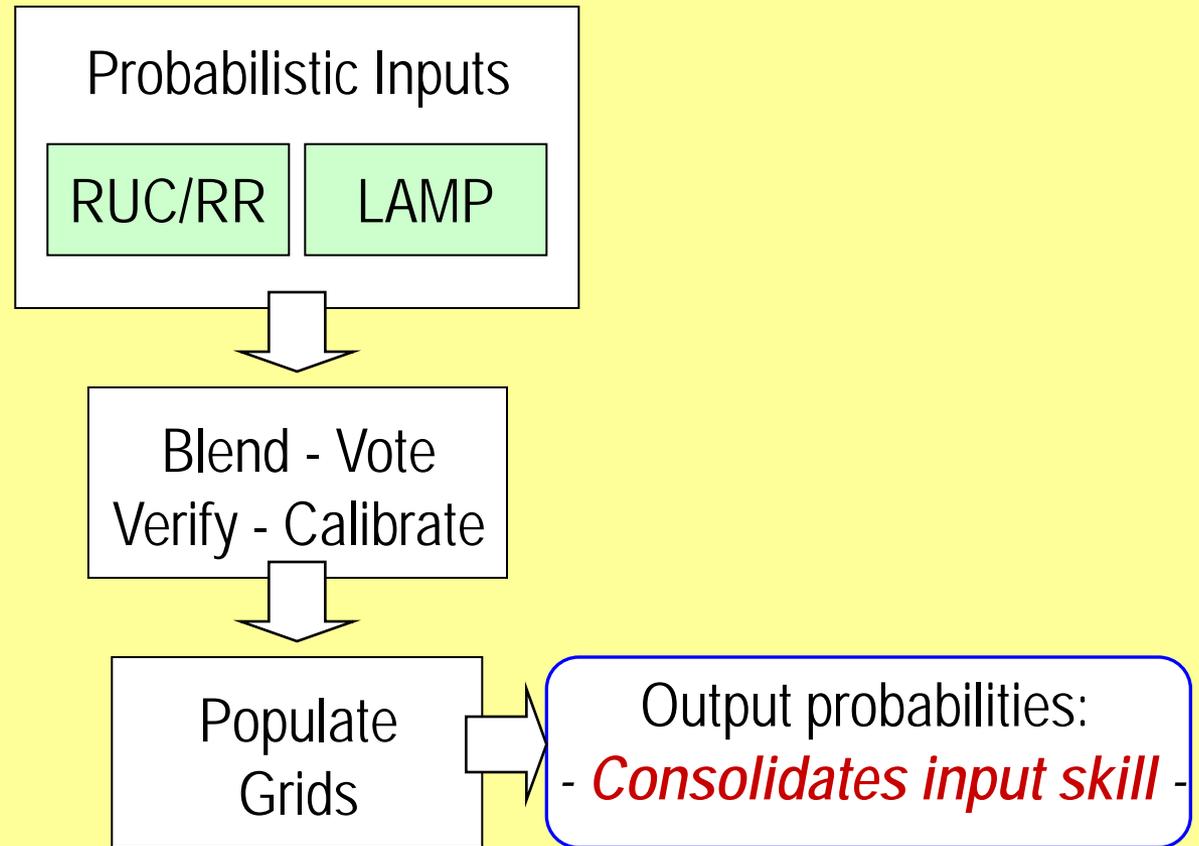
## **NCV key questions, FY09-FY10:**



- What is the skill of LAMP & time-lagged RUC or RR?
- Can we advantageously consolidate multiple sources?
- Can smart blending itself add new skill?

# NCV Probabilistic Forecast Methodology

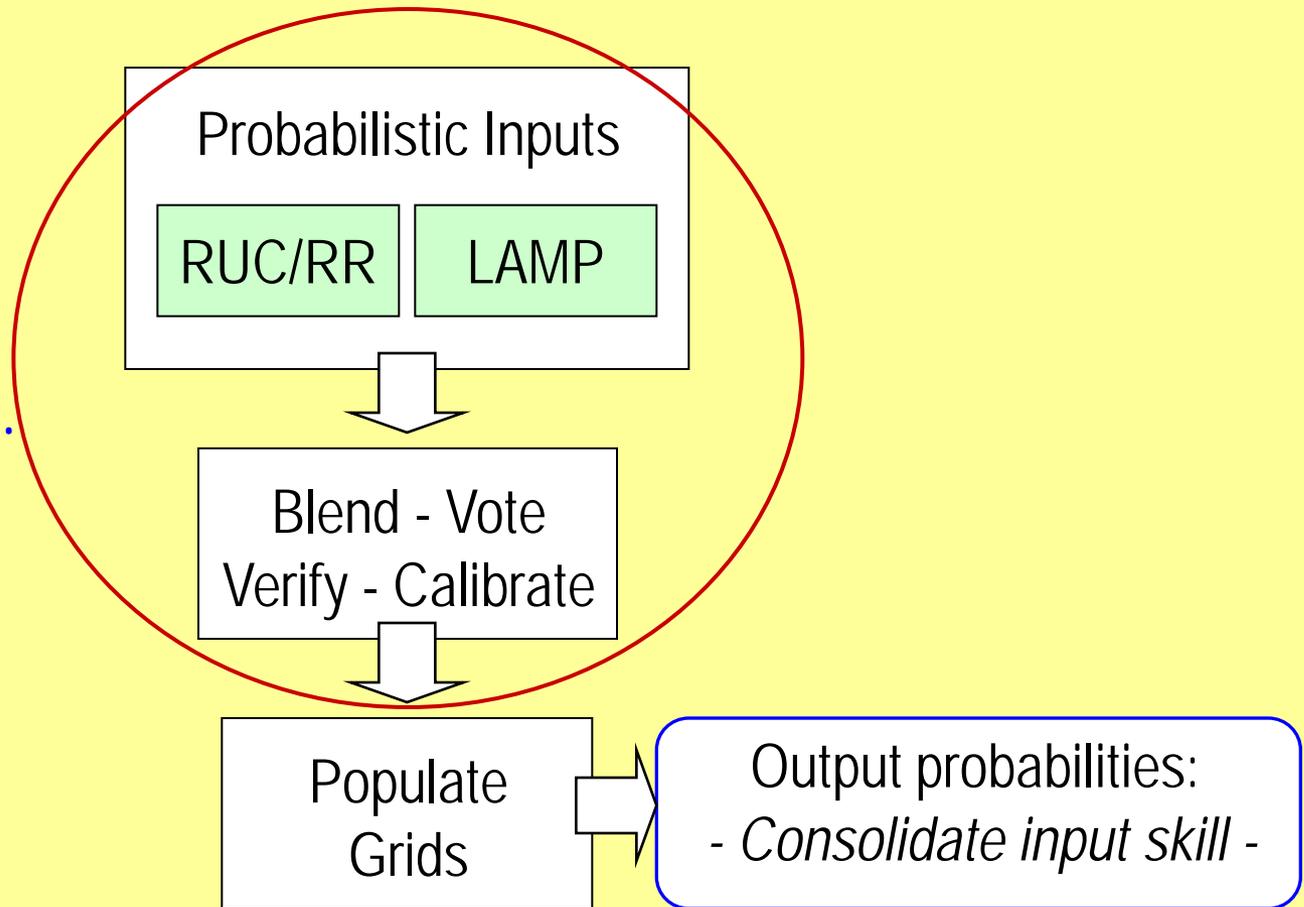
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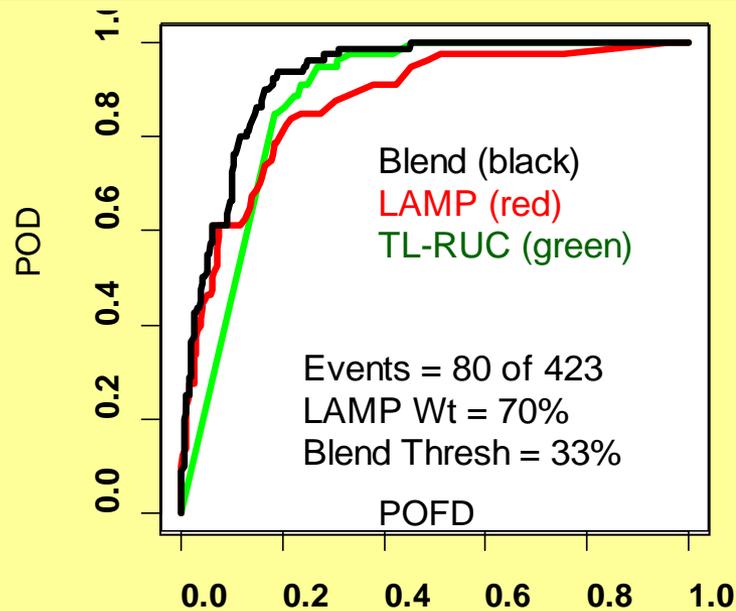
# NCV Probabilistic Forecast Status Today

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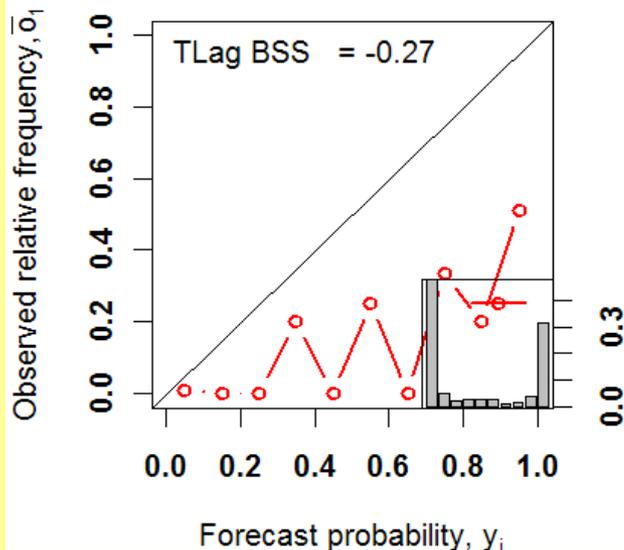
Prototype  
testing today...



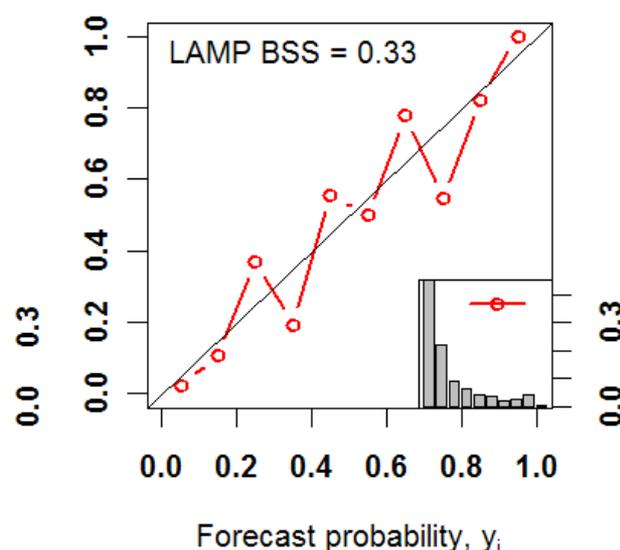
# Sample of Prototype Results



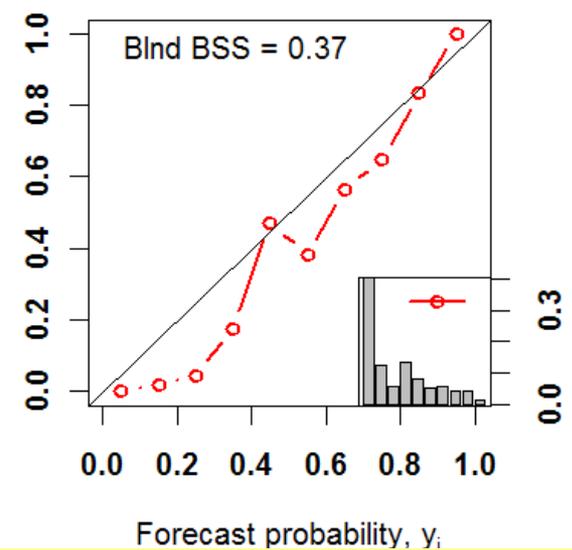
RUC Time-Lag KCVG 5hr C1000



LAMP KCVG 5hr C1000

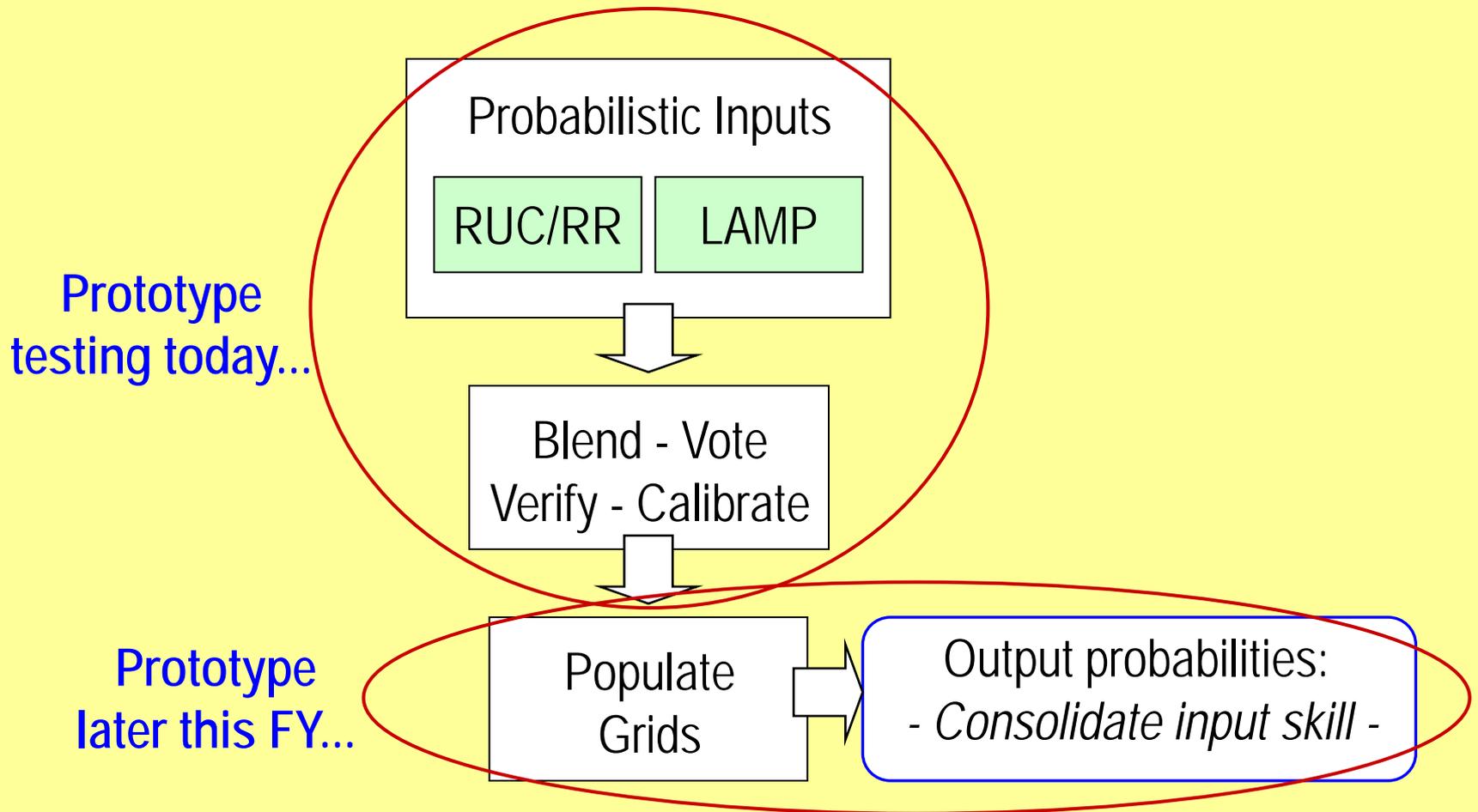


Blend KCVG 5hr C1000



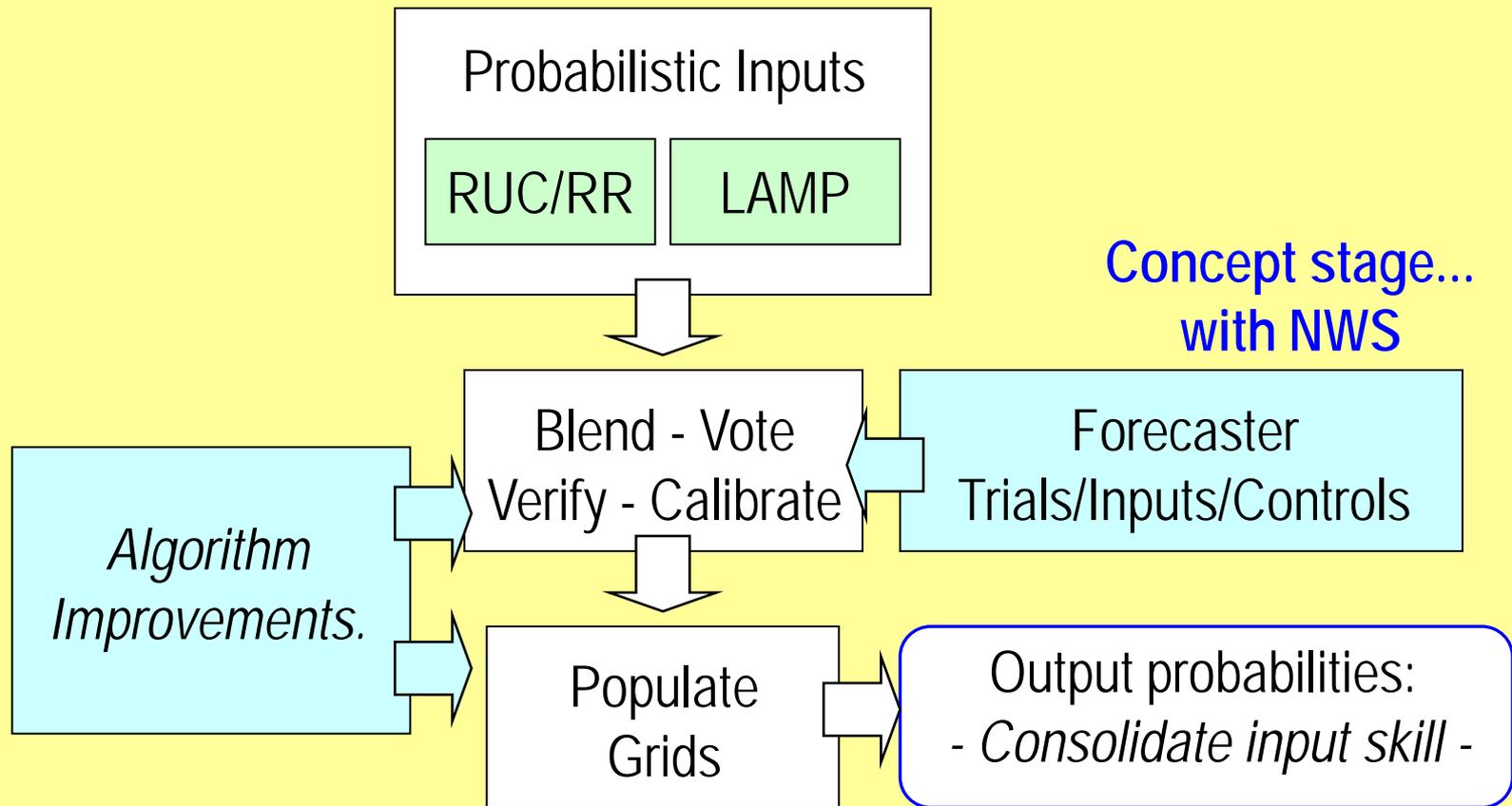
# NCV Probabilistic Forecast Status Today

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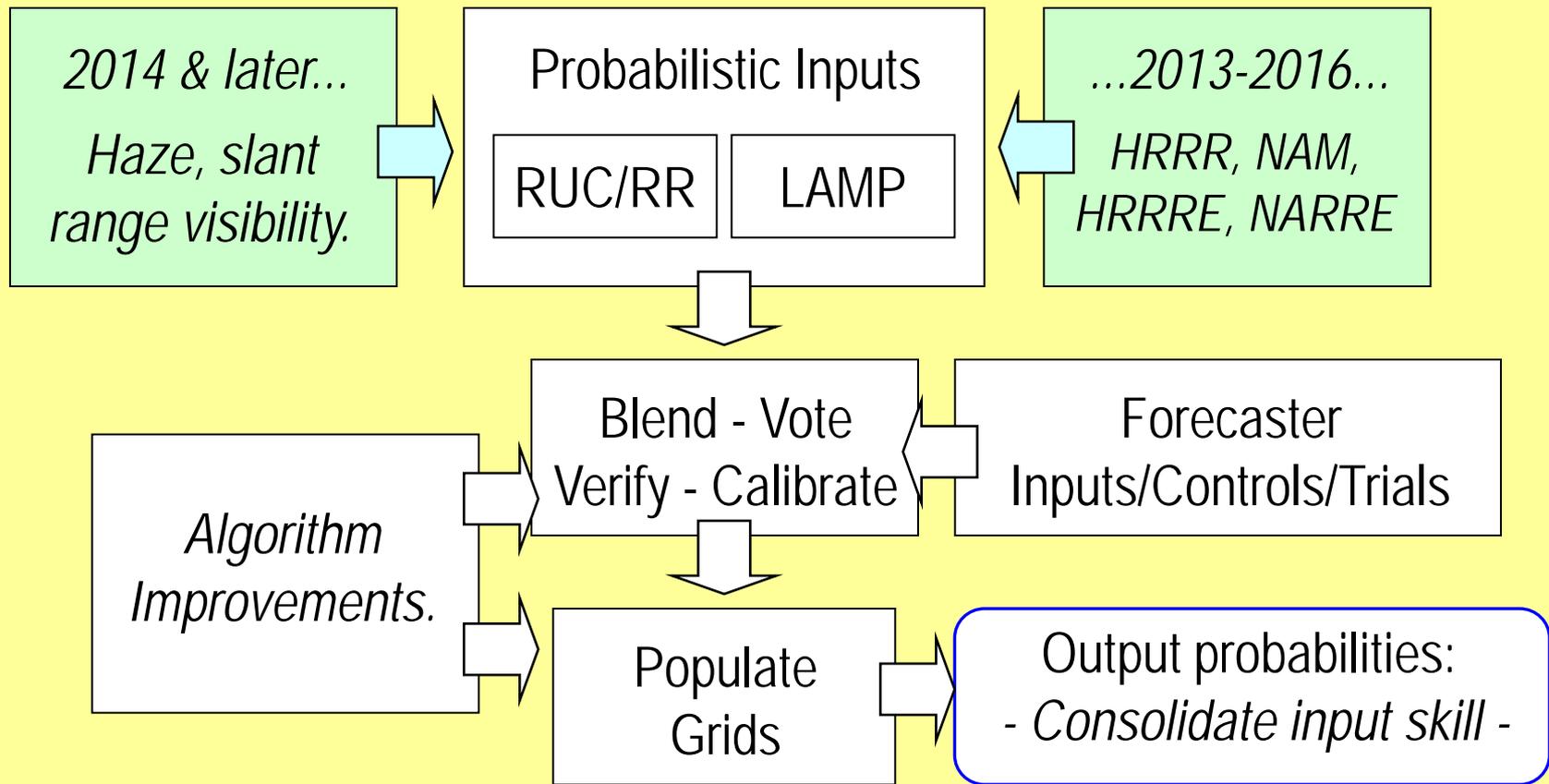


# NCV Probabilistic Forecast Status Today

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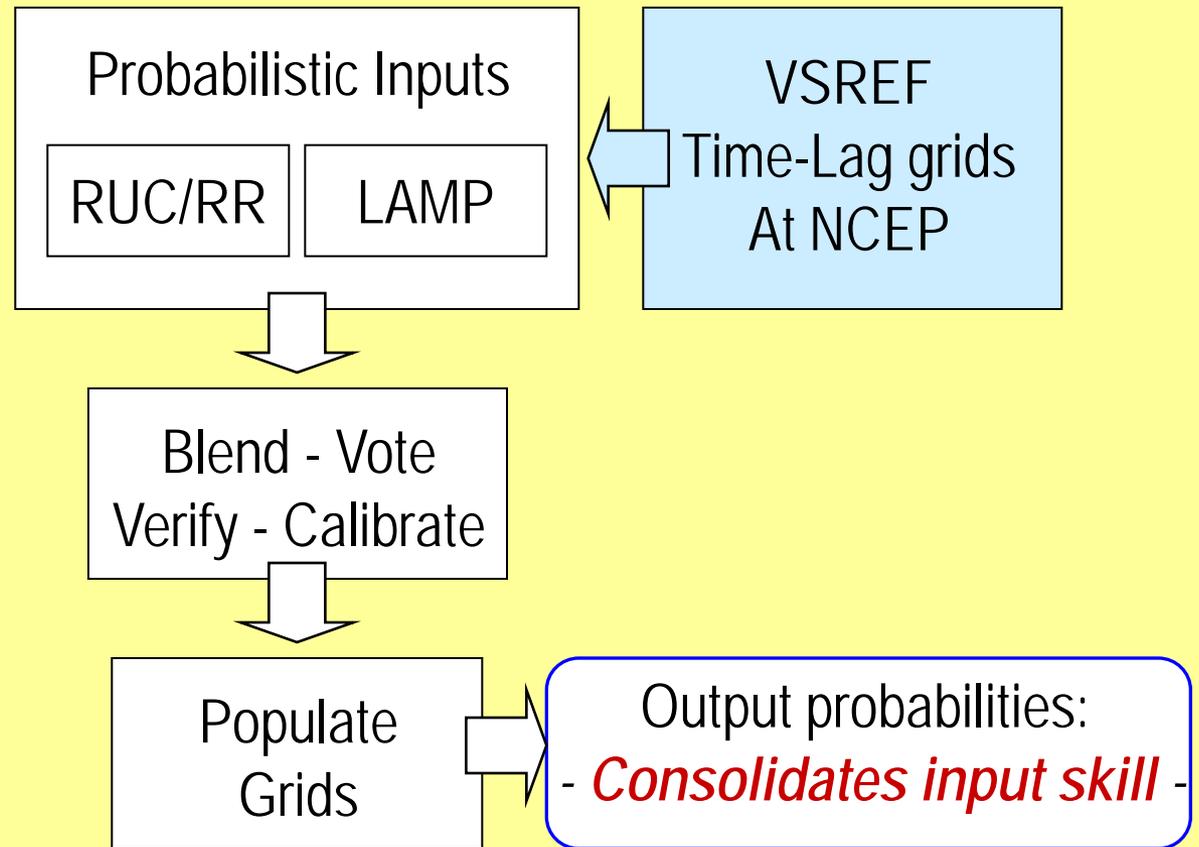
# NCV Probabilistic Forecast - Future



- Capitalizing on advancing modeling capabilities -

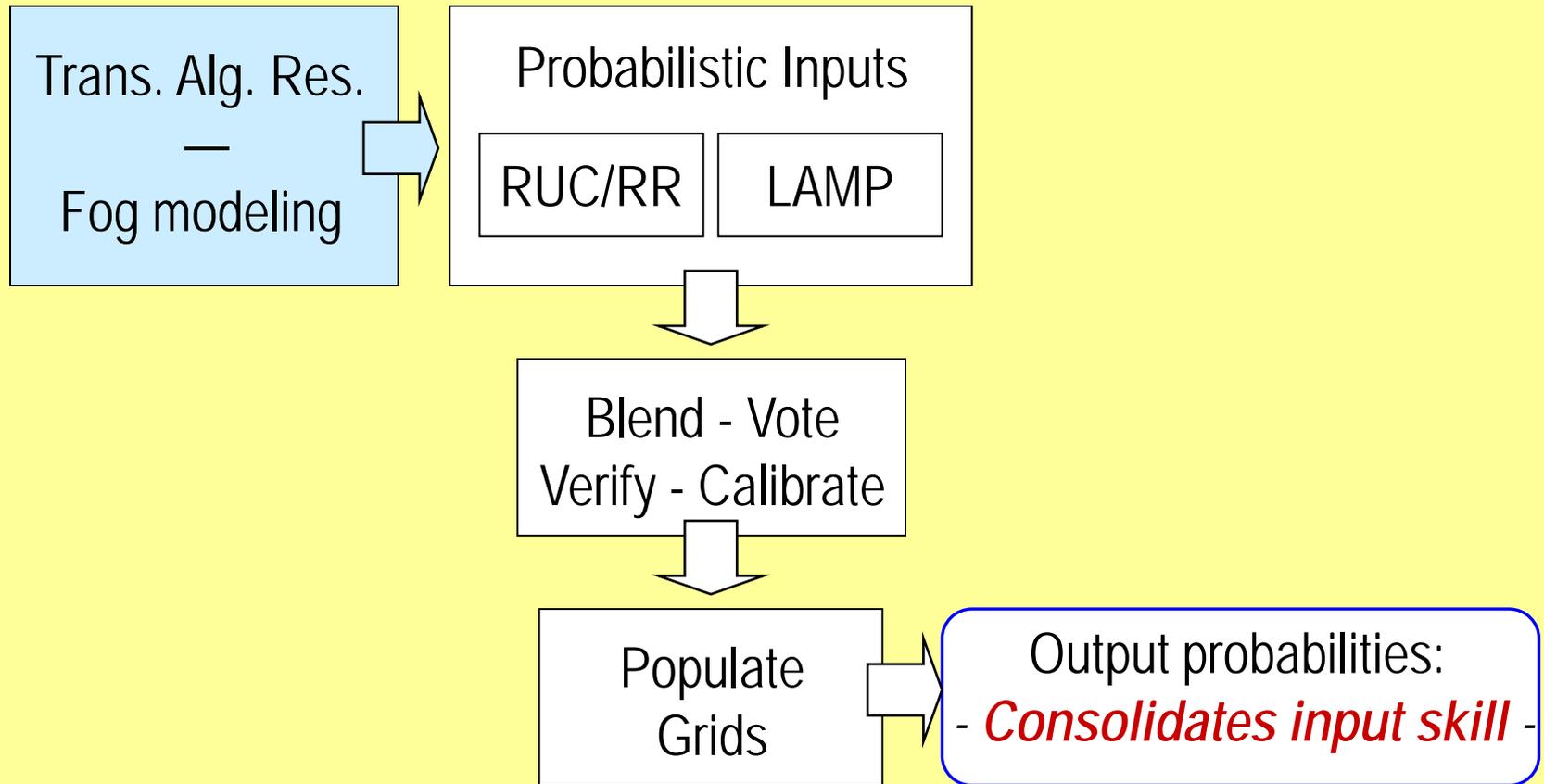
# An untried opportunity today...

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# Two opportunities beyond scope today...

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# Upcoming NCV milestones...

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- Sep 2010** > **V0.5 prototype 1-12hr probabilistic fcst system.**
- Based on time-lagged RR, LAMP, NCV ObCast.
  - Gridded, issued hourly.
  - Discrete predictands (e.g.,  $C < 500$ ,  $C < 1000$ ,  $V < 1$ , etc.)
  - Limited regional (multi-state) domain ... TBD.
- Dec 2011** > **V1.0 R&D complete. As V0.5 plus...**
- Full CONUS domain
- Dec 2013** > **V2.0 R&D complete. As V1.0 plus...**
- True ensembles replace/augment time-lagged ensembles.
  - Adds use of HRRR, NAM & other forecast resources.
  - Forecast duration to 24-30 hr.
  - Probabilistic 0hr analysis shows current conditions.
  - Skill/confidence metric expresses forecast uncertainty.

# Summary

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## What does NCV's forecast work enable?

- Approach – value-added blending method.
  - capitalizes on NWP, LAMP, statistical skill; also future skill.
- NCVF V1 – 1<sup>st</sup> probabilistic C&V forecast grid through NVEC evaluation.
- NCVF V2 – adds true ensembles, 0-hr analysis with calibrated uncertainty.

## Opportunities for:

- NCEP, GSD...VSREF and other grids.
- **NASA/LRC** cloud products ... Usable for V2 0-hr C&V analysis.
- **GOES-R** ... Critical to improved characterization of sfc obs gap areas.
- NWS ... Critical to forecaster role, associated algorithm improvements.

## Gaps affecting C&V readiness today:

- **RVR forecast research.**
- Model translation algorithm research.
- Implementing results of fog forecast research.